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Finnish Aviation Museum

Finnish Air Force Fighter Squadron 33:
Instructions on the use of the MT aircraft

1944-1952 period

During 1943-1944, Finland acquired as interceptors a total of 162 Messerschmitt Bf 109 fighters from Germany. 48 of the received aircraft were of type G-2, 109 were of type G-6 (of which two G-6/AS) and two were of type G-8. The Messerschmitts served with great success, and the last of them were withdrawn from service in 1954.

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Fighter Squadron 33

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I. AIRCRAFT (Messerschmitt Bf 109 G-6)

SPECIFICATIONS.

Length of aircraft 9 m, width 10 m. Empty weight ca. 2800 kg, in full combat readiness ca. 3500 kg, with wing cannons ca. 3800 kg. Wing loading ca. 220 kg/m^2, power-to-weight ratio ca. 0,4 hp./kg.

The aircraft is of full metal construction. The elevator, rudder and ailerons are fabric-covered. To protect the pilot, the windshield of the canopy is reinforced with a 60 mm plexiglass armor, the rear part of the opening canopy is fitted with a 60 mm plexiglass head protection armor (in the older type of canopy 11 mm steel), and the rear wall of the cockpit with 11 mm back armor. To protect the fuel tank there is a two-part light metal armor behind the tank. The fuel tank is entirely made of rubber and has a wall thickness of ca. 8 mm. Hence, it can be compressed together for e.g. installation. The tank wall will seal small-caliber bullet holes. Allowed operating time for the fuselage 450 h.

E n g i n e:

Mercedes-Benz DB 605 A-1. 12-cylinder, liquid-cooled and equipped with a supercharger for 5,7 km rated altitude. Maximum power at sea level 1475 hp, at rated altitude 1355 hp. Maximum continuous power ca. 1080 hp. The coolant is a mixture of clean water and glycol, top-up volume ca. 75 l. Lubricant weight ca. 30 kg. Fuel 87 octane aviation gasoline. Volume of fuselage fuel tank ca. 420 l, jettisonable auxiliary tank 285 l.

Fuel consumption:

At 1475 hp power	ca. 480 l/h.
At 1355 " "	ca. 440 "
At 1080 " "	ca. 320 "

Allowed operating time for engine 110 h.

A r m a m e n t:

The fixed fuselage armament consists of a MG-151 20 mm cannon firing through the propeller hub and two 13 mm MG-131 machine guns in the upper part of the fuselage in front of the cockpit, firing synchronized through the propeller disc. In aircraft fitted with wing cannons, additional MG-151's in both wings outside the propeller disc. Ammunition for the fuselage cannon ca. 120-140 rounds, for the wing cannon ca. 75-80 rounds. Ammunition for both machine guns ca.250 rounds. Firing speed of the cannon ca. 700 rounds/min, muzzle velocity ca.700 m/s. Firing speed of the machine gun ca. 900 rounds/min, muzzle velocity ca. 700 - 750 m/s.

The MG-151 cannon can use the following ammunition:

1.	Practice round	Round	weight	115 g.
2.	Armor-p.inc.r.	"	"	117 "
3.	-"-	"	"	115 "
4.	Expl.r.	"	"	115 ",1,4 s.tracer ca. 750 m.
5.	-"-	"	"	115 ",1,5 s. tracer self-ign. at ca.700 m.
6.	Inc.expl.r.	"	"	115 ",3 s.tracer ca. 1200 m.
7.	-"-	"	"	115 ", 3,3 s.tracer ca.1300 m

In the MG-131 machine gun, the following ammunition can be used:

1.	Inc.expl.r.	round	weight 34 g,	1,7 s. tracer ca. 760 m.
2.	Armor-p.r.	"	" 38,5 ",	1,7 s. tracer ca. 650 m.
3.	Expl. r.	"	" 34 ",	without tracer
4.	-"-	"	" 34 ",	1,7 s. tracer ca. 650 m.
5.	Armor-p.expl.r.	"	" 38,5 ",	1,7 s. tracer ca. 750 m.
6.	Armor-p.r.	"	" 38 ",	2,5 s. tracer ca. 750 m.
7.	Expl. r.	"	" 34 ",	1,7 s. tracer self-ign. ca. 700 m.

The MG-151 cannon is loaded and fired electrically. The mains switch in the instrument panel supplies current to the operating circuit. After this, by a press of the firing button on the control column, the loading motor loads the cannon and firing takes place immediately as the hammer mechanically ignites the cap.

The MG-131 machine gun is loaded, fired and synchronized electrically. The aforementioned mains switch and the machine gun switch supply current to the operating circuit. After this, by pressing the machine gun trigger on the control column, the loading motor loads the gun, the hammer strikes the cap which acts as an electric switch, and only after the synchronizing pulse closes the circuit the electric cap ignites and fires the gun. The cannon and machine gun belts are assembled from loose links bound together by the round. The belt thus disintegrates when firing.

Bomb load to the electric rack under the fuselage either one 500 kg or four 50 kg.

When used as a night fighter, usually an aircraft with wing cannons and equipment amended with a vertical speed indicator and pilot has life jacket or rubber dinghy.

R a d i o e q u i p m e n t:

FuG 16 Z short-wave radio 41,5 mc/s. (ca. 7 m). Range: aircraft - aircraft, certain contact at low altitudes ca. 30 km, with increasing altitude contact up to 200 - 300 km.

Ground station - aircraft at 1000 m certain contact ca. 100 km, at 4000 m ca. 200 - 250 km.

Homing device, which includes a fixed loop antenna in the aircraft and a direction and distance indicator in the instrument panel. In emergency suitable also for blind landing.

Instrument flight equipment:

Artificial horizon, turn and bank indicator, airspeed indicator, vertical speed indicator, chronometer, compass and homing device.

F l i g h t p e r f o r m a n c e:

Take-off run ca. 400 m, landing run without brakes ca. 600 m. Ceiling ca. 11000 m.

Climb times:

To 1000 m	ca. 1 min.	To 2000 m	ca. 2 min.
To 3000 "	ca. 3 "	To 5000 "	ca. 5 min. 15 s.
To 8000 "	ca. 10 "	To 11000 "	ca. 17 min.

Speed during climb ca. 270 km/h.
Cruising speed ca. 420 km/h.
Landing speed ca. 160 km/h.

Speed at 0 m	ca. 540 km/h.
" 5000 "	ca. 650 "
" 8000 "	ca. 620 "

Dive speed limit 750 km/h.

Diving time from 9000 m to 5000 m ca. 35 s.
" " " 7000 " " 2000 " ca. 40 s.
" " " 5000 " " 0 " ca. 40 s.

Turning time at speed 400 km/h. 180° ca. 13 s.
" " " " 450 " 100° ca. 14 s.

Range at cruising speed ca. 550 km.
" " max. speed (theor.) ca. 540 km.

Radius of operation without auxiliary tank at cruising speed ca. 260 km.
At max. speed (theor.) ca. 250 km.
Equipped with auxiliary fuel tank at cruising speed ca. 450 km.
Max. speed (theor.) ca. 420 km.

II. AIRCRAFT OPERATING INSTRUCTIONS.

A. Start-up.

1. Inquire from mechanic-in-charge whether aircraft is ready for take-off.
2. Lock canopy to "closed" position.
3. Fuel cock to P 1 + P 2 setting.
4. Throttle open ca. 1 inch or according to advice from mechanic.
5. Propeller blade pitch control on automatic.
6. Coolant radiator control to "open" position.
7. Battery switch on.
8. In main switchboard, "generator" (N:o A 8) and"propeller current" (N:o A 14) switches on.
9. Prime according to advice from mechanic (0 - 15 times), after which pilot gives the mechanics the signal to begin starting.
10. Electric fuel pump on ca. 15 - 30 sec. before starting.
11. Switch to M 1 + M 2 position when mechanic gives the agreed signal.
12. Using the right hand, pull the starter lever strongly and be prepared to prime using the left hand when the engine starts.
13. If after 10 -15" after start-up the oil pressure gauge does not indicate 6 - 8 kg/cm^2 pressure when the engine is cold, the engine must be stopped.
14. Fuel pressure must rise immediately after start-up to normal reading, if not, the engine must be stopped.
15. When engine has properly started, switch off current to the electric fuel pump.

B. Warm-up and run-up:

1. Run the engine at ca. 700 - 800 rev./min. trying to keep oil pressure below 8 kg/cm^2.
2. The proper warm-up is done at ca. 1000 rev./min.
3. Test the fuel pumps with the fuel cock in positions P 1 and P 2, holding it in each position for ca. 30 - 60 sec. The fuel pressure must remain inside normal limits.
4. Test the operation of the coolant radiators in "Closed " - "open" - "automatic" positions, leaving it in the end to "open" position.
5. Test the operation of the generator by switching off battery current, running up to 1300 - 1500 rev./min, and noting from the electric instruments that the generator is supplying current.
6. When oil temperature rises by 20° and pressure stays below 8 kg/cm^2 even with increased revolutions, run-up and testing of the magnetos can be made.

Revolutions are adjusted to 2300 rev./min., the switch to M 1 and M 2 positions; while doing this, revolutions must not decrease more than 70 rev./min. Prop. pitch indicator must read 11.5o.

After this, open up throttle. The engine must achieve at least 2500 revolutions, at most 2600 rev./min. and exactly 1.3o manifold pressure. Propeller pitch reading at this point ca. 12.oo +-5.

C. Taxiing.

1. Test brakes immediately when beginning to move.
2. Switch on radio.
3. Taxiing is made with brisk S-turns, watching the front sector closely.
4. At latest during taxiing, the flaps are extended 20° and the stabiliser set to +1° position.

D. Take-off.

1. Ensure that the canopy is locked.
2. Ensure that the tail wheel is locked.
3. Ensure that the stabiliser is set to +1 position.
4. Ensure that the flaps are 20° down.
5. Ensure that the propeller is on automatic.
6. Set coolant radiator shutters to automatic.
7. Switch on electric fuel pump.
8. Immediately after take-off retract the landing gear.
9. Lower manifold pressure to ca. 1.15 - 1.2o and revolutions 2300 rev. /min.

10. Retract flaps when speed exceeds 200 km/h.

11. Switch off electric fuel pump.

12. Ensure by pulling that the landing gear push buttons are all the way back in secured position.

Note!

During the take-off run, be prepared for the aircraft first trying to turn slightly to the right and then to the left. The turning may easily be prevented by applying the rudder pedals (with the heels).

E. Cross-country flight.

Manifold pressure 1.o, revolutions 2000 - 2100 rev./min, propeller pitch 9.45 - 9.5o.

F. Landing.

1. Switch on electric fuel pump.
2. Open coolant radiator shutters (in winter only in the final stage of the approach).
3. Decrease airspeed below 300 km/h.
4. Extend the landing gear. When the gear has been locked in the down position, ensure by pulling that the push buttons are all the way back.
5. During the glide lower the flaps (setting 40^{o}).
6. Stabiliser to ca. -3 position or according to feel.

Glide speed 200 - 220 km/h. when far from the field, at threshold lower to 180 km/h. At landing the aircraft is pulled onto three points.

Note!

During the landing run, possible turning tendencies must immediately be countered, in the early stage, when airspeed is large, by use of rudder, later by use of brakes.

G. Taxiing after landing.

1. Unlock tail wheel.
2. Switch off current to electric fuel pump.
3. Retract flaps all the way or -20^{o}.
4. Stabiliser $\pm$ 0.
5. After leaving the runway, switch off the radio.

H. Stopping the engine.

1. Coolant radiators to "closed" position.
2. Idle cut-off lever to down position until the engine has stopped.
3. Switch off ignition current.
4. Switch off battery current.
5. Loosen safety harness.

III. FORCED LANDINGS.

A. General:

In the following, forced landing means a flight condition in which the engine is not running at all, or is running so badly that the airspeed necessary for controlling the aircraft can be maintained only at the expense of altitude (i.e. by gliding).

1. Forced landing sites in order of suitability:

Airfields, fields and meadows with underground drainage, smooth sand beaches, fields with open ditches, swamps and waterways, young, small woods, forests with thick trees, hills and mountains. For the last three sites, success cannot usually be guaranteed, hence in these cases one must bale out.

2. It is best to stick with the site that has been selected for forced landing all the way, even if a seemingly more suitable place were to present itself at a later stage. Making the landing always suffers from switching the site, because then there is usually little time and the landing is made more or less hastily.

3. When the engine stops, one must remember to quickly push the nose down to maintain airspeed.
The glide angle is noticeably steeper than normal when the engine is not running.

4. If the engine is running, even badly (e.g. on idle), 200 - 210 km/h. airspeed must be maintained.

Possibility of making turns:

Altitude 100 m	- ca. 10° - 15°	changes in direction
" 200 "	- ca. 40° - 45°	turn
" 300 "	- ca. 60° - 70°	"
" 400 "	- ca. 90° -100°	"
" 500 "	- ca.120° -140°	"

5. <u>If the engine stops completely, 220 - 230 km/h. glide speed must be maintained</u>.

<u>Possibility of making turns:</u>

Altitude	100 m	- ca. 5^{o} - 10^{o}	changes in dir.
"	200 "	- ca.15^{o} - 20^{o}	"
"	300 "	- ca.30^{o} - 40^{o}	turn
"	400 "	- ca.50^{o} - 60^{o}	"
"	500 "	- ca.70^{o} - 80^{o}	"

6. When beginning a turn, airspeed must be increased considerably from the aforementioned values, e.g. 250 - 280 km/h.

7. When gliding at best glide speed 200 - 230 km/h. airspeed must be decreased only when close to surface, but even then airspeed must be kept slightly above normal. This is done because if one flies at too low airspeed and the aircraft hits an obstacle, the risk of flipping over is great. In addition, one must try to reach the selected landing spot even if one "overshoots" it. This is better than the aircraft hitting an obstacle <u>before</u> the landing spot.

8. If the engine stops at low altitude, e.g. take-off, large changes of direction must not be made, only steer clear of buildings and other larger obstacles if possible.

9. A forced landing must be made, if possible, close to roads and dwellings, so that help is available quickly if needed, but not in cases where it makes performing the landing and succeeding more difficult. When landing in water, one must land parallel to the shoreline close to the shore.

B. <u>Proper landing procedure.</u>

1. <u>Always keep the landing gear retracted</u>, even if landing on an airfield.

2. The propeller pitch control must be switched to manual and set to gliding position (if the engine has completely stopped, set propeller pitch indicator to 6.oo position).

3. When the engine stops, the fuel cock must be closed, the ignition and current circuit must be switched off. Even when the engine is running, these must be switched off before coming close to the surface.

4. In aircraft equipped with a turning gunsight, it must be secured to the side, and in aircraft with a fixed gunsight it must be removed using the gunsight forced release.

5. In aircraft equipped with the older type of canopy (the stronger canopy), the slide panels must be opened
In aircraft equipped with the newer type of canopy (the weaker canopy) it must be jettisoned.
(One must pull the canopy emergency release inside the aircraft, if the canopy does not come off, one must open the locking mechanism of the canopy).
When jettisoning canopy, one must bend down forward to avoid being hit in the head by the released canopy.

6. Flaps must be fully extended, but only after it is estimated that the aircraft is certain to glide to the selected landing spot.

7. Safety harness must be tightened, especially the shoulder harness must be pulled very tight.

8. Just when the aircraft is beginning to touch the surface, one must with the hands take a firm grip on the instrument panel e.g. by the gunsight in order to possibly avoid hitting one's head against the panel or something else.

C. Forced landings into different places.

1. Landing on an airfield:

Landing on an airfield, when such an opportunity exists, is completely without risk. The aforementioned things must be taken into account. One must try to make the landing into the wind, normally, not stalling the aircraft.

2. Landing on ice:

When landing on ice, one must do it parallel to the shoreline because, to begin with, the surface is hard to make out on snow-covered ice. Otherwise there's nothing different about the landing procedure, except if the ice is thin, one must land either very close to the shore in the shallows or in such a way that the aircraft ends up ashore, in which case the canopy must be jettisoned.

3. Landing on a field or meadow with underground drainage:

If the site is big enough, the landing is without risk. Taking into account the aforementioned things, the landing will succeed with minor damage.

4. Landing on a sand beach:

If the sand beach is smooth and large enough, landing will succeed well with a certain amount of damage. This kind of beach isn't common, and is in practice seldom available.

5. Landing on a field with open ditches:

This is the forced landing site most often encountered in practice. Chances of success are good. When selecting the landing direction, one must note that it is not necessary to land parallel to the ploughing direction, if the length and quality of the landing area would be decreased.

6. Landing in water:

Landing in water will succeed well if certain things are taken into account. The canopy must unconditionally be jettisoned and the safety harness opened. The parachute harness must be completely detached from one's back. This is because the aircraft will begin sinking instantly as the speed decreases. If possible, the landing must be made parallel to the shoreline and as close to it as possible, into the wind.

7. Landing in a young wood:

Landing into woods like this still has a fair chance of succeeding, if the trees are small and grow densely. However, this is not very recommendable.

8. Landing in a forest with thick trees:

If there aren't any better places to be reached than a forest with thick trees, it is best to bale out if possible.

9. The most important thing for a successful forced landing is maintaining airspeed. All decisions must be made with consideration and calmly, yet fast.

D. Baling out of the MT aircraft.

Baling out of the MT aircraft must be considered necessary at least in the following cases:

- when the aircraft is on fire
- when the aircraft has lost its controllability because of damage
- when the aircraft has lost its controllability after entering such a state of flight that an accident cannot be avoided
- when the engine has stopped and a life-saving forced landing site is not available
- when the pilot has been wounded in a such a way that he loses or is later during the flight at risk of losing his ability to control the aircraft.

The lowest safe bale-out altitude must be considered to be 150 m.

Bale-out procedure:

When baling out, the pilot must open the safety harness, detach the radio cable from its socket, detach the oxygen mask tube from its connector or the oxygen mask from the head gear. The canopy must be jettisoned either by using the emergency canopy release located high left forward, or if this doesn't work, by opening the canopy locking lever and helping the canopy open by hand, the airflow will take care of the rest. When the canopy comes off, one must bend down.

If there is time and opportunity, one must try to get the aircraft to climb and lower the airspeed below normal cruising speed before baling out. Assume a position that poses minimum danger of getting caught in the aircraft by limb or gear and allows making use of leg power in the jump. Jump either down to the side fully exerting the legs, or use the stabiliser to make the aircraft fully nose-heavy, in which case one can jump straight up while pushing the control column strongly forward so that a centrifugal force as strong as possible will help the pilot to get outside the tail surfaces.

IV. OPERATING INSTRUCTIONS FOR THE RADIO.

(Radio FuG 16 and 16 Z)

1. Connect the head gear to the radio socket in aircraft.
2. Switch on heating (in aircraft equipped with it) and leave it on for ca. 1' before switching on the transformer.
3. Ensure that the selector is set to the frequency in use (In Fl.R 3 presently in use Fü-1 41,5 mc/s).
4. Switch on transformer when starting to taxi. When the engine is running under 1600 - 1800 rev./min. one must avoid using the radio, because this puts a heavy strain on the battery.
5. Check quality of transmission. When speaking, press the tangent on the front side of the control column carefully to avoid transmission cutting off.
6. After taxiing to the starting point for take-off, one must always ask the field duty officer for permission to take off.
7. After take-off, one must check quality of transmission.
8. If the other station is weakly audible, one must turn the volume control up. The volume control is at the low right in front.
9. When reception is bad or not receiving at all (receiver is not tuned correctly) even after the volume control has been turned, one must use the fine tuner which is located at the low right in front. One must ask the ground station for transmission and turn the fine tuner to one direction or the other, whereupon the station will become audible at some point. Then one must stop turning the tuner immediately and return it to center position (will center itself if in working order).
   If reception does not improve, the fine tuner motor has turned beyond the audible band. In this case one must turn the tuner the other way for a very short time, because otherwise it will again turn beyond the audible band.
10. Usually, if even a weak reception is achieved, one must use the fine tuner with caution, especially if lacking experience in operating it, because the result of inexperienced use of the fine tuner often is that reception is lost altogether.
11. The Fern - Nahe selector must be used e.g. when flying in tight formation (must be turned to Nahe (close) position).
    Usually and always at longer-range connections one must use the Fern (far) position.

Operating instructions for the homing device.

1. When commencing a homing flight one must ask the ground station to switch on the homing beacon.

2. Turn the frequency selector to the homing frequency, posit. 2 (42 mc/s.). The homing frequency is the next frequency clockwise from the speech frequency.

3. Turn the homing switch to "ZF" position (down position).

4. In the homing indicator, the horizontal indicator displays the signal power of the transmitting station, which can be used to deduce whether we are close by or far away. In addition, when arriving close to the transmitting station, a chirring sound can be heard in the headphones.

5. The downwards-pointing needle of the homing indicator shows the direction of the aircraft with regard to the beacon. One must remember that when flying towards the beacon, the correction must be made in the opposite direction from the one shown by the needle.

   So, the indicator works in a "showing" manner, i.e. it shows the direction of the error. When flying away, the indicator works in a "Commanding" manner, i.e. it shows the direction in which the correction must be made.
   If it is not known whether one is flying towards or away from the beacon, this is easy to find out by pressing e.g. the left pedal. If the indicator needle "follows", i.e. swings to the left, one is flying towards the beacon, if it swings to the right, one is flying away from the beacon.

6. After completing the homing flight, the selector must be switched to the operating frequency. It must be noted that during homing flight, the aircraft cannot hear transmissions from the ground station.

7. Turn the homing switch to "FT" position (up position).

8. Notify the ground station that the beacon is no longer needed.

9. After landing, when one has taxied away from the runway, that is the take-off and landing area, one must switch off the transformer (radio), at latest when one has taxied to the parking location.

10. One must report to the radio mechanic possible faults detected during flight, and to the officer who gave the flying mission the quality of radio connections.

V. INSTRUMENT FLIGHT EQUIPMENT OPERATING INSTRUCTIONS.

1. Before taking off on an instrument flight one must ensure the following things:
   - the homing device on the aircraft is working
   - a vertical speed indicator is installed
   - there is a chronometer on aircraft or pilot
   - the aircraft flies straight
   - the altimeter is reset to 0 position.

2. After take-off, the aircraft is trimmed by the stabiliser to level flight.

3. The artificial horizon and turn indicator are made operational by pressing down the switch in the switchboard (from pilot's point of view, the second button in the top row). After waiting for 1 min. the rim of the artificial horizon is turned from "secured" (Fest) position to the left to "open" (Los) position.
Check the indication of the artificial horizon and the turn and bank indicator when the aircraft is in level flight.

4. In most aircraft, the pitot tube heating is connected to the aforementioned switch. In aircraft with a separate pitot tube switch, it must be turned on before entering a cloud.

5. In the MT aircraft, two adjustable pointers are attached to the rim of the altimeter. These can be utilised in the following tasks:
   - to indicate the prevailing air pressure (altitude) at the landing field
   - to indicate the elevation of obstacles (e.g. mountains) along the route
   - to indicate the altitude at which one is planning to fly
   - when flying in cloud, the pointer can be adjusted to mark the cloud base and when climbing above the cloud, the other pointer to mark the upper limit of cloud.

   With the pointers set like this, one can fly in cloud all the time by staying at an altitude between the pointers.

6. Upon completion of instrument flight, the rim of the artificial horizon is turned right to "secured" (fest) position and the switch is turned up.
The pitot tube switch is turned up.

VI. OPERATING INSTRUCTIONS FOR THE OXYGEN SYSTEM.

1. Before taking off on a high-altitude flight one must ensure that the pressure gauge of the oxygen tank shows 150 atm. If the amount of oxygen is less than this, one must notify the mechanic, who will fill the tank.

2. The oxygen mask is placed on the face and the tube is connected to the oxygen tube of the aircraft.

3. Test the operation of the oxygen system by opening the valve and breathing while checking the movement of the pressure and flow gauges.

4. When climbing above 4000 m, open the valve. If the flow of oxygen isn't normal (the flow gauge does not "breathe" in pace of one's own breathing), it can be increased by pressing the button in the middle of the "lung", whereupon the tank will release more oxygen.

If during flight the pressure gauge drops below 20 atm one must immediately descend below 4000 m.

5. Upon completion of high-altitude flight (preferrably right after descending below 4000 m) the oxygen system valve is closed tightly and the button in the middle of the "lung" is pressed so that the pressure gauge drops to 0.

VII. OPERATING INSTRUCTIONS FOR THE WEAPONS.

A. Things to check before take-off to gunnery practice:

1. That the aircraft has been trimmed to fly straight.

2. Check the gunsight light. The gunsight is located below the cockpit windshield at eye level of the pilot. The gunsight is always grabbed by the right hand and turned to the left, whereupon the sight is in its operating position. After this, using the battery mains switch NA 18, turn on the current. The switch is located at the lower edge of the main switchboard or is a spoon-like push switch at the right side wall of the cockpit. By pulling the fader switch backward, light is turned to the reflector glass. When the switch is at its rearmost position, the light is at its brightest. The switch is located on top of the sight at the right edge. (In a fixed gunsight it is a right-turning knob below the sight).

3. Inquire from armourer staff whether the guns are loaded.

4. Find out which triggers operate the different weapons. In normal use, the MG 131:s are fired by the trigger at the upper end of the control column and the MG 151 by the push button on top of the control column. If wing cannons are fitted, the fuselage guns are fired by the trigger and the wing cannons by the button.

5. Ensure that the weapons main switch is in down position to avoid firing accidents. It is located below the cockpit windshield on the left side of the ammunition counter. (The switch for the wing cannons is in the main switchboard the furthest push button in the top row).

6. Check that the ammunition counters are showing correct numbers of rounds.

B. Things to take into account before commencing firing:

1. Pull the gunsight to its correct position.

2. Switch on the gunsight light.
The intensity of the light must be adjusted according to the prevailing lighting conditions.

3. Lift the weapons main switch to up position and check from the loading indicator whether the guns load, and lift the front trigger away from covering the cannon button into firing position. After this, firing may commence.

4. While firing, follow the operation of the weapons from the blinkers of the ammunition counters below the cockpit windshield. When these show white, the weapon is loaded and ready to fire. If they show black, the weapon is either out of ammunition or has malfunctioned. If the malfunction is caused by a faulty cartridge, the fault is corrected automatically by letting go of the trigger, whereupon the loading motor will perform a re-load and the weapon is once again ready to fire.

C. Things to take into account after firing is completed:

1. Lift the front trigger to cover the cannon button.

2. Weapons current switch to down position.

3. Switch off gunsight light.

4. The gunsight must be set to resting position by pressing the sight with the right hand and turning to the right and pushing in.

D. Procedures after landing:

Report to the armourer staff possible unused ammunition, malfunctions of the weapons and other things that may have occurred.