After WW1 two committees were appointed:

- The CDF (Commission pour la Défense aux Frontières = commission for the defence of the borders) decided the locations of: artillery and infantry bunkers, referred to as ‘ouvrages’ (defence works), casemates (big blockhouses), interval blockhouses, shelter bunkers and observatories, and worked on their developments, general layout and initial costs.
- The CORF (Commission d'Organisation des Régions Fortifiées = commission for the organization of the fortified areas) coordinated such data and was in charge of building the fortifications.

Between 1927 and 1935, the CORF built the main defence works of the Maginot Line:

- 46 artillery defence works (23 in the north-east and 23 in the south-east)
- 62 infantry defence works (35 in the north-east and 27 in the south-east)
- 340 big blockhouses/casemates and bunkers
- 17 observation bunkers
- 89 shelter bunkers
- floodable areas, barracks, underground telephone networks, dedicated roads and railroads etc.

After 1935, the CORF had ended its mission. The fortified areas are in charge of the generals in command of these sectors. Between 1935 and 1940 thousands of smaller and less protected positions were built, mainly small blockhouses in the intervals between the bigger defence works. They were erected by regular troops and reservists until the battle broke out. They were referred to as "MOM", which stands for army craft (main d'oeuvre militaire) and "STG" (service technique du génie) if built by pioneers. The 7.PzD for example which is often said as having crossed the Maginot Line encountered in fact only some of the lighter extensions of the Maginot Line, with smaller and lesser protected/armored bunkers.

The fortifications that belong to the Maginot Line proper, surrendered only when the mobile interval troops had retreated, when they were deprived of artillery support and when the Germans had surrounded them. The casemates on the Rhine and the blockhouses in the Vosges were actually given up when their crews had gone in for belated hopeless tasks. Whenever such bunkers were supported by artillery they resisted to the point of filling the Germans and Italians with admiration. They often surrendered only after orders given by the High Command, and many of them did so only one week after the Armistice had been signed.

The choice of building the Maginot Line had several goals:

- Avoid a surprise attack like in Belgium, Netherlands ... and give alert
- Cover the mobilization (at least 2-3 weeks)
- Economize the French forces (France had only 39 millions citizens against 70 millions for Germany and much less 20-25 year old men in the Army than Germany had)
- Protect Alsace/Lorraine and its industry
- Be the departure line for a counter-attack
- Force the Germans to attack by the flanks (Belgium or Switzerland)

Only after Dunkirk Hitler decided to attack the Maginot Line. The German crossed the Rhine and destroyed several small bunkers but the big defence works, even attacked by heavy support (420mm Skoda heavy mortars, 1000kg bombs etc) resisted to all assaults and inflicted heavy losses to the enemy. About 22,000 encircled men in Alsace/Lorraine mobilized 240,000 Germans and in the Alps 60,000 frontline alpine troops encountered 312,500 Italians.

Oddly enough, the Maginot line was a success; it accomplished exactly what it was intended to do. It wasn't designed to fully protect France from an attack from the east, though the Maginot line mentality fostered the idea that it would. It was designed to compensate for France's inferiority in troops, versus Germany, by reducing the area that the field army had to cover, and by freeing up personnel for that field army's manoeuvre divisions. It did exactly that. It wasn't the Maginot line's fault that the French High Command wasn't able to use the field army effectively.

The Germans launch operation Tiger against the Maginot line in the Sarre area on 14th June, on a 30 km front between Saint-Avold and Sarralbe in Moselle. The Germans engage 6 infantry divisions and 3 divisions in reserve, a total of 9 divisions. The German troops involved are the XXX.Korps (258.ID and 93.ID), XII.Korps (268.ID and 75.ID) and XXIV. Korps (60.ID and 252.ID). That makes 155,000 men supported by 1,052 field guns and 8.8cm FlaK. It is the strongest artillery concentration of the campaign in France. The 79.ID, 198.ID and 168.ID are in reserve. About 300 German bombers are supporting the attack. On the French side there are only 4 fortress infantry regiments, 2 colonial MG regiments (about 17,000 men) and 114 field guns. They will fight in 1 vs 9 odds. The German attack is a complete failure and the German troops lost 1,200 KIA and 4,000 WIA during this single day, including:
• 252.ID : 106 KIA
• 268.ID : 156 KIA
• 258.ID : 50 KIA, 350 WIA
• 60.ID : "heaviest losses of any division involved"
• 93.ID : 257 KIA and 970 WIA over 14th-21st June, about half on 14th June

The French troops had 679 KIA and 1,800 WIA.

On 15th June 1940, the Germans launch operation Kleiner Bär against the Maginot line in Alsace, on the Rhine. The Germans engage 8 divisions : 6. Gebirgsdivision, 213.ID, 218.ID, 221.ID, 239.ID, 554.ID, 556.ID and 557.ID. The first five divisions are good ones but the last three are rather second line troops. These troops are supported by more than 5 artillery regiments and strong air support (including 150 Stukas). The French have to fight 1 vs 10 and there are less than 10 field howitzers (a few 75mm and several 155mm) to support them. The French 104e DIF (42e RIF, 28e RIF and 242e RI – 8 battalions) is alone to face the German assault on the Rhine between Rheinau and Neuf-Brisach on a 30 km front. There are also 5 companies in the fortifications (CEO = compagnie d'équipage d'ouvrage) and the 5e DBCPy (5e Chasseurs Pyrénéens half-brigade) with the 9th and 10th battalions. Less than 10,000 French troops to face more than 100,000 German troops. The French fortifications on the Rhine were only smaller bunker and due to the ground water they have no underground levels at all, these were surface fortifications with simplified armament. Due to the small size, there for example no 47mm AT guns and except a few 37mm AT guns, only 13.2mm HMGs as AT weapons. The German assaults are at first repulsed or reduced to very small bridgeheads. Several counter-attacks are led by French "groupes francs", which for example manage to take again the town of Vogelgrun. Nonetheless, on the north, in what was initially a diversion attack, the 557.ID, manages to establish a bridgehead in Rheinau. The German troops loose 766 KIA, 2,567 WIA and 117 MIA. On 16th May the Germans manage to break through the French lines (on the canal behind the Rhine itself) in several areas and the encircled French troops in their bunkers continue to fight or withdraw in the woods where they continue to resist. On 17th June the remaining French troops are ordered to retreat to the Vosges heights and valleys where they will fight until 25th June. A 9th German division is in this area, on the hinge between the 104e DIF and the 103e DIF, the 555.ID, will cross the Rhine only on 18th June to take Strasbourg. The cities of Colmar, Mulhouse and Strasbourg in the Alsation plain are occupied on 19th June.

During operations Tiger and Kleiner Bär, the Germans grouped heavy AA guns (8.8cm Flak) to fire directly at the bunkers at less than 200m and to destroy them while 3.7cm Flak and 3.7cm PaK had to blind/destroy the weapons crenels and observation means of the same bunker. In front of each French bunker there were about 4 to 6 AA/AT guns.

Armistice came in application on 25th June 1940. At that date, from the Maginot Line in the North-East some 45 defense works out of 53 and 130 casemates/blockhouses were still fighting and many defense works surrendered only on 7th July. Looking at these facts the Maginot Line did play a good part of its role. It avoided an immediate surprise attack like in Poland, Belgium, Norway etc. It covered the mobilization period and no enemy incursion occurred during this period, it efficiently protected the industries in Alsace/Lorraine and forced Hitler to attack the neutral Belgium where elite troops were send to stop them. Everyone now knows that they did not manage to stop them and that they were in fact only attracted in Belgium. Defeat was not a fatality and the Maginot line was not the reason of that defeat but became often the scapegoat.

In several areas (Thionville, Bitche, Wissembourg) the Maginot Line was a real 20-30 km depth defence system :

1) Anti-tank barriers / gates as well as bridges / crossings ready to be blown

2) Fortified Houses

Located close to the border and on the edge of towns bordering Germany, they have to control all approaches. They were designed to provide early warning of a potential enemy attack. Their main mission is to activate explosive charges to destroy or block accesses, roads, bridges etc. and to warn the rear lines (direct telephone line, liaison motorcycle).

Each of the fortified house consists in :

- a bunker surmounted by a house (or two bunkers side by side with a house) and surrounded by a barbed wire fence
- an armored barrier on the road, manned from inside the bunker
- 100x AT mines
- 20x AT stakes or "piquets Ollivier" : this was an improvised AT mine using a 3.5kg explosive charge or an old 120mm artillery shell (4.2kg explosive) dug vertically in the ground, with a 1m stake attached to the explosive charge or fuze. A tank hitting it would detonate the charge or shell. The "piquet Ollivier" was directed against the wheels, tracks and bottom armor of the tanks when they rolled over it. This device was mainly used in the Maginot line, it was often hidden in bushes and hedges but mainly deployed around the fortifications : among the rails of anti-tank obstacle and among the stacks of barbed wire networks.
6 soldiers inside the bunker equipped with:

- 1x 37mm AT gun
- 2-4x FM 24/29 LMGs
- 2x VB launchers (rifle grenade)
- crenels for the small arms (rifles, carbines)
- 2x "goulotte lance-grenade": a very close defense device to eject defensive F1 hand grenades around the bunker without exposing the soldiers.
- 1x liaison motorcycle

3) Fore-posts
Located about 2-3 km behind the border. Bunkers armed with MGs, 25mm AT guns and former navy 47mm and 65mm guns.

4) AT rails lines and AT ditches + mobile AT gates on the roads

5) The main resistance line at about 10 km from the border

Big defence works: 46 artillery and 62 infantry defence works
The defence works are made up of two clusters (rear and front) of combat blocks linked together by a long underground gallery. The combat block are generally topped with copulas embedded in the concrete. These copulas are armed with LMGs and 50mm mortars and are actually the bunker’s observatories. These defensive work are protected by up to 3.50m of iron/concrete, resisting to 420mm and 520mm artillery shells.
The rear cluster consists of two entries (2 blocks):

- The ammunition entry provides space for handling loads and embodies two blockhouses, which where armed with twin MAC31 MGs, 37mm/47mm AT guns, LMGs and hand-grenade launchers.
- The men's entry was also armed with such weapons. Around 25-30m below ground level, it houses barracks, power supply, kitchens, water tanks, medical facilities etc.

The front cluster consists of several infantry and artillery combat blocks:

- The infantry blocks include blockhouses (with copulas and crenel armaments) and rotating, retractable twin MGs turrets.
- The artillery blocks include blockhouses (with copulas and crenel armaments) with copulas and rotating, retractable twin guns/howitzers/mortars turrets.

Each block has several levels with elevators, ammunition storages, order transmitters to communicate from one room to an other, water tanks, power supply, a small barrack etc. Each defence work is protected by a network of traps, barbed wires, embedded spikes and upright standing rails including AT mines, and could provide coverage fire to their neighbouring defence works.

340 blockhouses/casemates
Topped with copulas they were built in the intervals between the bigger defence works and protected their flanks and rears. They were each manned by 25 to 30 soldiers and equipped for self-sufficient operations. They used to be connected by telephone or radio to one another and to neighbouring bigger defence works, and held the weaponry used for short range coverage fire.

17 observation bunkers
Located on the heights of neighbouring hills, in addition to those within the big defence works, they are strongly built up posts provided with copulas and designed to spot out enemy concentrations and give warning to neighbouring defence works and/or blockhouses by telephone or radio.

6) 89 Shelter-bunkers with their infantry units
Those multiple level barracks are protected by very thick concrete-iron layers. They are usually located a few km behind the big defence works. They were manned by interval mobile troops to help ward off enemy inroads and to counter-attack.

7) The second line of resistance at about 15 km of the border
This line consists of the innumerable MOM and STG blockhouses and bunkers which are also present to fill the gaps between the bigger blockhouses / defence works.

8) Mobile artillery units including heavy railroad artillery

9) Rear infrastructures at 15-25 km from the border
Equipments and ammunitions dumps linked to the first lines by dedicated roads and railroads.
Arrangement in Depth of Maginot Line
Main Defences 4 to 6 miles from Frontier
- Casemate double -

- Casemate simple -

- Casemates simples en "couple" -

- Casemate vue par l'ennemi -
combat block
The main types of copulas (embedded deep in the concrete of the bunkers) are:

**Cloche GFM M1929 (GFM = guetteur, fusil-mitrailleur) = spotter/LMG copula**

1-2 on each casemate
Armor: 20-30cm (type A) and 25-30cm (type B) steel
Equipments:
- FM 24/29 LMG in alternance with a 50mm mortar
- episcopes/binoculars (L.639 episcop + 8x binocular in type A and diascope and 7x type E sight in type B)
- often a retractable periscope on the top of the copula

The armament/binoculars could be moved from one loophole to an other depending from the area to defend.

**Cloche JM M1930 (JM = jumelage de mitrailleuses) = twin MG copula**

Armor: 20-30cm steel
Equipments:
- 2x MAC31 MGs
- episcopes/binoculars

**Cloche AM M1934 (AM = arme mixte) = mixed armament copula**

Armor: 25-35cm steel
Equipments:
- 1x 25mm AT gun + 2x MAC31 MGs
- episcopes/binoculars

**Cloche d’observation = observation copulas**

Various models with episcopes and periscopes
VD = vision directe = direct vision, with binoculars and episcopes
VP = vision péricopique = periscopic vision = with a periscope only
VDP = vision directe et périscopique = with binoculars, episcopes and a periscope

There are various models of periscopes/binoculars, magnifications are: 1x, 1.4x, 2x, 7x, 8x, 12x or 25x.
The main types of turrets are:

1) Artillery retractable turrets (traverse 360°)
   - 2x 75mm guns / howitzers
   OR
   - 2x 81mm mortars
   OR
   - 2x 135mm mortars / howitzers

2) Infantry retractable turrets (traverse 360°)
   a) Tourelle à deux armes mixtes = double AM turret
      - 2x [1x 25mm AT gun + 2x MAC31 MGs]
   b) Tourelle à une arme mixte + mortier de 50mm = AM turret with mortar
      - 1x 25mm AT gun + 2x MAC31 MGs
      - 1x 50mm mortar (able to fire also if the turret is retracted)
   c) Tourelle de mitrailleuse = MG turret
      - 2x MAC31 MGs
Tourelles éclipseables à armement d'infanterie

Tourelle à 2 armes mixtes
(Canon de 25 + Mitrailleuses)

Embrasures
(2 x 1 canon de 25 + 2 mitrailleuses)

Visée

Tourelle Mitrailleuses

2 M.

Tourelle à une arme mixte + mortier de 50 mm

Tir en éclipse du mortier 50

Mitrailleuses

Visée

Canon de 25

Tir en batterie du mortier de 50 mm

Tourelles éclipseables à armement léger.
1) Machineguns, light mortar and close defense

a) Fusil Mitrailleur Châtellerault Mlé1924/29 (in bunkers, casemates or copulas and on access doors)
   - In blockhouses (single or twin mounts)
   - On all the rear access doors of casemates, shelters or bunkers
   - In the GFM copulas

b) Mitrailleuse 7.5mm "Reibel" MAC Mlé1931 (in casemates or turrets)
   - In blockhouses (twin mounts and 2.3x telescopic sight – L.638, L.639 or L.672 (heavy balls) sight)
   - In blockhouses (twin mounts and 2.3x telescopic sight – L.638, L.639 or L.672 (heavy balls) sight) in alternance with the AT guns, thanks to a rail system
   - In the JM and AM copulas

c) Mitrailleuse de 13.2mm Hotchkiss Mlé1930 (in casemates)
   It has been mounted in bunkers/ blockhouses of the Maginot Line on the Rhine and in the Vosges fortifications which were too narrow to be equipped with 37mm or 47mm AT guns. The twin 13.2mm HMG used in these fortifications has some anti-tank capacities and it is used in alternance with the MAC31 twin mounts. They are fitted with 2.3x L.660 sight.

d) Goulotte lance-grenade (in casemates)
   A very close defense device to eject defensive F1 hand grenades around the bunker/blockhouses without exposing the soldiers. They are often mounted on the rear of the casemate to protect the doors and on the front/sides to throw grenades in the “fossé diamant”, the ditch around the bunker. The ditch has a protection role but it is also thought to receive the multiple rubbles after bombings so that they do not block the main armament.

e) Mortier de 50mm Mlé1937 (in casemates or copulas)
   - In blockhouses (45° elevation)
   - In the GFM copulas (20° elevation)
   Rate of fire : 15 rpm
   Max. Range : 695 m
f) Anti-tank stakes, anti-tank mines and anti-personnel mines around the fortifications

- **Anti-tank stakes or “piquet Ollivier”:**
  This was an improvised AT mine using a 3.5kg explosive charge or an old 120mm artillery shell (4.2kg explosive) dug vertically in the ground, with a 1m stake attached to the explosive charge or fuze. A tank hitting it would detonate the charge or shell. The “piquet Ollivier” was directed against the wheels, tracks and bottom armor of the tanks when they rolled over it. This device was mainly used in the Maginot line, it was often hidden in bushes and hedges but mainly deployed around the fortifications: among the rails of anti-tank obstacle and among the stacks of barbed wire networks.

- **Anti-tank mines:**

  - Mine anti-char légère (light AT mine)

  - Mine anti-char lourde (heavy AT mine)

- **Anti-personnel mine, bounding, M1939:**
2) 75mm guns

a) 75mm guns in CASEMATES

In the blockhouses added to the observation means in the copulas and the gunsights there are generally two types of observation sights:
- type H: 1.2x magnification and field of view 49.50°
- type G: 3.5x magnification and field of view 11.70°

**75mm Mle1929 (gun / howitzer)**
- Caliber: 75 mm
- Barrel length: 2721 mm
- Elevation: -8° to +40°
- Traverse: 45°
- Telescopic sight: L.647
- Rate of fire: 30 rpm (12 rpm in intensive fire)
- Range: 12100 m

**75mm Mle1932 (à “pivot fictif”, with Nordenfeld breech) (gun / howitzer)**
- Caliber: 75 mm
- Barrel length: 2421 mm
- Elevation: -8° to +40°
- Traverse: 45°
- Telescopic sight: L.656
- Rate of fire: 30 rpm (12 rpm in intensive fire)
- Range: 11900 m

**75mm Mle1932R (with Nordenfeld breech) (howitzer)**
- Caliber: 75 mm
- Barrel length: 1555 mm (Mle1905 barrel)
- Elevation: -17° to +34°
- Traverse: 45°
- Telescopic sight: L.655
- Rate of fire: 30 rpm (12 rpm in intensive fire)
- Range: 9200 m

**75mm Mle1931 (mortar)**
- Caliber: 75 mm
- Barrel length: 1371 mm
- Elevation: -3° to +35°
- Traverse: 45°
- Telescopic sight: L.634
- Rate of fire: 30 rpm (12 rpm in intensive fire)
- Range: 6000 m

**75mm Mle1933 (gun / howitzer)**
- Caliber: 75 mm
- Barrel length: 2421 mm
- Elevation: -9° to +40°
- Traverse: 45°
- Telescopic sight: L.650
- Rate of fire: 30 rpm (12 rpm in intensive fire)
- Range: 11900 m

b) 75mm guns in retractable TURRETS

**75mm Mle1935 (x2) (gun / howitzer)**
- Caliber: 75 mm
- Barrel length: 2421 mm
- Elevation: -2° to +40°
- Traverse: 360°
- Telescopic sight: ?
Rate of fire : 26 rpm in intensive fire
Range : 11900m

**75mm Mlí1932R (x2) (howitzer)**
Caliber : 75 mm
Barrel length : 1555mm
Elevation : -5° to +35°
Traverse : 360°
Telescopic sight : L.655
Rate of fire : 26 rpm in intensive fire
Range : 9200m

**75mm Mlí1905R (x2) (gun / howitzer)**
Caliber : 75 mm
Barrel length : 1555mm
Elevation : 0° to +30°
Traverse : 360°
Telescopic sight : ?
Rate of fire : 26 rpm in intensive fire
Range : 8200m

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**75mm guns ammunition :**

- Obus de rupture Mlí1910M (APHE)
- Obus perforant AL (Allongé Lefèvre) Mí916 (APHE)
- Obus perforant AL (Allongé Lefèvre) Mí918 (APHE)
- Obus explosif Mí900N (HE)
- Obus explosif Mí915 (HE)
- Obus explosif Mí917 (HE)
- Obus explosif Mí918 (HE)
- Obus explosif FA Mí929 AL (HE)
- Obus à balle "A" Mí897 (canister)
- Obus à balle "M" Mí897/1911 (canister)
- Obus à balle "A" Mí897/1917 (canister)
- Obus fumigène Mí915 (smoke shell)
- Obus éclairant Mí916 (illuminating shell)
- Obus incendiaire Mí916 type G (incendiary shell)

In the Maginot line the ammunition dotation for the 75mm guns/howitzers/mortars was theoretically of :

- 70% HE shells
- 27% canister and shrapnel shells
- 3% APHE shells
- various other shells (smoke, illuminating an incendiary) were probably mostly issued to field artillery

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**3) 135mm howiters / mortars**

**135mm Mlí1932 in CASEMATES**
Caliber : 135 mm
Barrel length : 1145mm
Elevation : 0° to +40°
Traverse : 45°
Rate of fire : 6 rpm
Range : 5600m

**135mm Mlí1932 (x2) in retractable TURRETS**
Caliber : 135 mm
Barrel length : 1145mm
Elevation : +9° to +45°
Traverse : 360°
Rate of fire : 12 rpm
Range : 5600m

4) 81mm mortars

81mm Mlle 1932 in CASEMATES
Caliber : 81 mm
Barrel length : 1575mm
Elevation : +45° (range is modified by propellant quantities and the +/- volume of gas liberated by outtakes)
Traverse : 45°
Rate of fire : 13 rpm
Range : 3600m

81mm Mlle 1932 (x2) in retractable TURRETS
Caliber : 81 mm
Barrel length : 1575mm
Elevation : +45° (range is modified by propellant quantities and the +/- volume of gas liberated by outtakes)
Traverse : 360°
Rate of fire : 26 rpm
Range : 3600m

5) Other guns

There are two "Mougin" turrets armed with two 155mm L Mle 1877 guns in the Barbonnet fort facing Italy. The original fort is dating from 1883 but it has been upgraded to the Maginot standards. The range is 9200m and the rate of fire only 4 shots in 3 minutes. The turrets are hand cranked for a 360° rotation in 3min 45s (with 4 men) or 45s (with 6 men).

There are also several 36 former German 100mm guns in the fortifications (dating from 1914-1918) around Metz, Mutzig and Thionville. These guns are in turrets, in single mounts for a range of 13000m.

There are also a few former German 150mm mortars in the north-east and one of them had been replaced by a French 155mm C Mle 1917 Schneider.

6) Anti-tank guns

a) 25mm Mlle 1934 RF (in copulas, turrets, bunkers, fortified houses and casemates)
L/40 : in various anti-tank copulas and turrets
L/47.2 : in "cloche AM" (AM copula, 1x 25mm AT gun coupled to 2x MAC31 MGs)
L/60 : in "tourelle AM" (AM turret, 1x 25mm AT gun coupled to 2x MAC31 MGs)
L/72 : in "casemate AM" (AM bunker, 1x 25mm AT gun coupled to 2x MAC31 MGs) and bunkers
Caliber : 25 mm
Rate of fire : 18-20 rpm
Telescopic sight : 4x (L.711 sight, field of view 10.13°)
Practical AT range : 600-800m

b) 37mm Mlle 1934 RF L/56.4 (in casemates), alternating with 2x MAC31 MGs
Caliber : 37 mm
Barrel length : 2088mm
Rate of fire : 20 rpm
Telescopic sight : L.653, 2.5x
Elevation : -15° to +10°
Traverse : 45°
Practical AT range : 800m

c) 47mm Mlle 1934 RF L/50 (in casemates) alternating with 2x MAC31 MGs
Caliber : 47 mm
Barrel length : 2350mm
Rate of fire : 20 rpm
Telescopic sight : L.652, 2.5x
7) Former navy guns used in anti-tank role

a) 47mm M\textsuperscript{le}1885 L/40 (in bunkers and gun emplacements)
   - Caliber: 47 mm
   - Barrel length: 1880mm
   - V\textsuperscript{o}: 650 m/s
   - Penetration: 35mm at 500m
   - Recoiless mount on open gun emplacement:
     - Elevation: -21°45' to +13°40'
     - Traverse: 360°

b) 47mm M\textsuperscript{le}1902 L/50 (in bunkers and gun emplacements)
   - Caliber: 47 mm
   - Barrel length: 2350mm
   - V\textsuperscript{o}: 690 m/s
   - Penetration: 45mm at 500m
   - Recoiless mount on open gun emplacement:
     - Elevation: -20° to +20°
     - Traverse: 360°

c) 65mm M\textsuperscript{le}1888/91 L/49.2 (in bunkers)
   - Caliber: 65 mm
   - Barrel length: 3200mm
   - V\textsuperscript{o}: 715 m/s
   - Penetration: 50mm at 500m

d) 65mm M\textsuperscript{le}1902 L/50 (in bunkers and gun emplacements)
   - Caliber: 65 mm
   - Barrel length: 3250mm
   - V\textsuperscript{o}: 800 m/s
   - Penetration: 55mm at 500m
   - Recoiless mount on open gun emplacement:
     - Elevation: -40° to +35° or -40° to +40° or -15° to +20° (different mounts)
     - Traverse: 360°

8) dismountable MG-turrets

a) Renault FT17 or FT31 turret
   - Armed with a M\textsuperscript{le}1914 Hotchkiss or a MAC31 MG

b) Dismountable turret M\textsuperscript{le}1935 and M\textsuperscript{le}1937
   - The dismountable MG turrets are armed with a M\textsuperscript{le}1914 Hotchkiss MG and generally equipped with a camouflage/anti-grenade nest around the turret. The MG itself is protected by armor. The turret is equipped with a type K periscope for observation (4x magnification) and is protected by 30mm armor on the top and 40mm armor on the sides. The turret is built in a concrete basis and the main entrance is located underground.
9) interval artillery units (position artillery regiments)

Between the important pillboxes and on the rears there were surface infantry and artillery position. Older guns/howitzers are often found in these positions but also the more usual and modern ones.

a) Canon Lahitolle 95mm M°1888

b) Canon De Bange 120mm L M°1878 and M°1878/1916
Max range : 8650 m

c) Canon De Bange 155mm L M°1877/1914
Max range : 9100 m

d) Canon De Bange 155mm L M°1918

e) Canon De Bange 155mm C M°1881
Max range : 6400 m

f) Mortier De Bange 270mm M°1885
Design of a typical fort: the defence work of Schoenenbourg (in northern Alsace)
Located on the right wing of the fortified area of Haguenau, the 'ouvrage' Schoenenbourg commanded all approaches from the north-east.

This defence work gathers all the main features arising from the experience acquired during the battles at Verdun (1916 to 1918), namely:

- the distant location of the rear entry from the front combat blocks, which allowed for the men not to be disturbed in their sleep, even when the fort underwent heavy bombardments;
- improved resistance possibilities, thanks to the Schoenenbourg's self-sufficient energy power generators, to the reserves of water, food and ammunition and to ventilation as well as liaison with the outside;
- stress laid on weapons within rotating, retractable turrets, such as heavy guns, mortars and twin MGs;
- the armament diversity of the various combat blocks, which ensured high efficiency;
- the ability of the Schoenenbourg to provide fire coverage to neighbouring blockhouses and the possibility of receiving coverage fire by them, on request;
- safe connections to all blocks, thanks to an underground network.

These principles were implemented as follows:

- at the front: 6 combat blocks (turret and casemate blocks);
- at the rear, about 1 km away from the front: 2 entries (for the men and the munitions);
- the setting up of the bunker's facilities in the rear: barracks, kitchens, hospital, power shop, water tanks, etc.;
- a network of galleries stretching over 3 km all in all, ensuring connection to the various sectors at a depth of 18 to 30 m below ground level with also a hidden exit (a vertical gallery filled with sand/clay, that could be emptied from the underground thanks to a simple procedure before using it evacuate).

Until 1941-1942 no known weapon could destroy such heavy bunkers, which by the end of the campaign of France turned out to have been impregnable so far.
The commander of Schoenenbourg's defence work was the "chef de bataillon" Martial Reynier. The garrison is composed of:

- 20 officers
- 60 NCOs
- 550 corporals and soldiers

TOTAL: 630 men

- About 250 men from the 156th RAP (Régiment d'Artillerie de Position) (artillery)
- About 180 men from the 22nd RIF (Régiment d'Infanterie de Forteresse) (infantry)
- About 160 men from the 206th bataillon du génie (engineers)
- About 40 men from various services (medical corps etc.)

The front cluster is composed of 6 combat blocks:

- 4 block with artillery turrets
- 2 casemates

The rear cluster is composed of 2 blocks protecting the men's and ammunitions' entries.

**BLOCK 8: entry of the men**
- 1 crenel for 47mm Mle 1934 AT gun / in alternance with MAC31 twin MGs
- 2 crenels for FM 24/29 LMGs
- 1 GFM copula armed with one FM 24/29 LMG and one 50mm mortar
- 1 mortar copula armed with a 50mm mortar
- 3 "goulottes lance-grandes" to launch hand grenades in the ditch around the block

**BLOCK 7: entry of the ammunitions**
- 1 crenel for 47mm Mle 1934 AT gun / in alternance with MAC31 twin MGs
- 3 crenels for FM 24/29 LMGs
- 2 GFM copulas armed with one FM 24/29 LMG and one 50mm mortar
- 3 "goulottes lance-grandes" to launch hand grenades in the ditch around the block
- 1 small bunker inside the entry corridor with a FM 24/29 LMG

**BLOCK 1: infantry casemate on two surface levels**
- 1 crenel for 47mm Mle 1934 AT gun / in alternance with MAC31 twin MGs
- 1 crenel for MAC31 twin MGs
- 1 crenel for FM 24/29 LMG
- 2 GFM copulas armed with one FM 24/29 LMG and one 50mm mortar
- 3 "goulottes lance-grandes" to launch hand grenades in the ditch around the block

**BLOCK 6: infantry casemate on two surface levels**
- 1 crenel for 47mm Mle 1934 AT gun / in alternance with MAC31 twin MGs
- 1 crenel for MAC31 twin MGs
- 1 crenel for FM 24/29 LMG
- 1 GFM copula armed with one FM 24/29 LMG and one 50mm mortar
- 3 "goulottes lance-grandes" to launch hand grenades in the ditch around the block

**BLOCK 2: MGs turret block**
- 1 GFM copula armed with one FM 24/29 LMG and one 50mm mortar
- 1 retractable turret with 2 MAC31 MGs

**BLOCK 3: 75mm guns turret block**
- 1 retractable turret with 2 75mm Mle 1932 R guns
- 1 GFM copula armed with one FM 24/29 LMG and one 50mm mortar

**BLOCK 4: 75mm guns turret block**
- 1 retractable turret with 2 75mm Mle 1932 R guns
- 1 GFM copula armed with one FM 24/29 LMG and one 50mm mortar
- 1 VDP copula

**BLOCK 5: 81mm mortars turret block**
- 1 retractable turret with 2 81mm mortars
- 1 GFM copula armed with one FM 24/29 LMG and one 50mm mortar
- 1 mortar copula with on 50mm mortar
TOTAL ARMAMENT :
- 75mm M1932 R guns : 4
- 81mm mortars : 2
- 47mm M1934 AT guns : 4
- 50mm mortars : 12
- MAC31 MGs : 14
- FM 24/29 LMGs : 18
- hand grenade launchers : 12

AMMUNITIONS STORED IN THE DEFENCE WORK :
- 75mm shells : 16,000
- 81mm shells : 6,400
- 50mm shells : 12,000
- 47mm shells : 2,400
- 7.5mm cartridges : 1,448,000
- many hand grenades, various explosives, flares etc.

On 20th March 1940, four 120mm M1878 De Bange guns equipped the Schoenenbourg defence work. These old guns had a slow rate of fire but they were very precise and suited harassing fire very well. The guns are operational on 5th April 1940, and divided into two batteries served by men from the block 5. S4 Battery, with two guns is deployed near block 6 and communicates with it by the means of a trench. S5 Battery, with the two guns left, is set up between the two entrance blocks, namely block 7 and 8.

From September 1939 to June 1940, the Schoenenbourg fort fired :
- 75mm shells : 15,792
- 81mm shells : 682
- 120mm shells : 723

TOTAL : 17,197 shells in 10 months

By mid-June 1940 all the Maginot Line positions were already encircled by German forces, which had reached the Swiss border. The interval troops, who were to cover the gaps in-between the defence works and casemates, had been withdrawn from their supporting positions, namely in the French Saar and in the areas stretching beyond Schoenenbourg up to the Rhine, in order to help create a new defence line on the Meuse river and the Marne to Rhine canal. To reach their new positions these troops walked night and day long, being often attacked by the Luftwaffe.

From 15th to 19th June 1940, the Germans attacked the Maginot Line itself and crossed the Rhine River near Colmar, in a well coordinated amphibious operation. They also proceeded through the weakly defended Saar gap, where the water barrier constituted a negligible obstacle without the presence of defending interval troops, which were in retreat to the south. The Schoenenbourg defence work, located on a key position covering the road from Wissembourg to Haguenau, was actually attacked by the 246.ID. The assaults were supported by 10.5cm, 15cm, 28cm, 35.5cm and 42cm guns, as well as by Ju-87 Stuka dive bombers and He-111 level bombers dropping 50kg, 100kg, 500kg and 1000kg bombs. Soon, the earth on and about the combat blocks got deeply cratered. The 81mm mortars turret suffered damage and a good hit by a 42cm shell nearly penetrated into its magazine, but fortunately it didn't pierce. The other combat blocks also underwent heavy shelling. Some shells penetrated into the permeable soil to explode 10-12m below. Nevertheless, after the bombing and shelling the turrets carried on shooting as much and as efficiently as before.

On the whole, the defence work underwent only little damage, which could be repaired in the night. Together with its neighbours, the "Hochwald" and the "Four à Chaux" defence works, the "Schoenenbourg" denied the German forces the way through. The 246.ID never managed to cross the defence line during its assaults and suffered heavy casualties.

The "Schoenenbourg" actually surrendered only several days after the armistice, complying with the orders given to Commandant Reynier by the French High Command in Paris. The "Schoenenbourg" was occupied by the German forces from July 1940 to end 1944. Before leaving the defence work, the Germans destroyed the two entries.

The Germans were pinned down by the artillery of the Maginot Line in their attempt to break through to the heights of Aschbach-Oberroedern. They had no other choice than to bombard the Schoenenbourg fort, hoping to silence it. For this, they employed regular field artillery, heavy artillery and the Luftwaffe. The Schoenenbourg fort was the most heavily bombarded position on the whole Maginot Line :
- From 14th May 1940 on, a 28cm heavy gun (RR gun) fired 33 shells at Schoenenbourg without any appreciable results
In July 1940, the Germans took possession of Schoenenbourg fort. They were to stay there until the beginning of 1945. At first, they were simply fascinated by the fort. They explored in detail this fortification which had been such a thorn in their side, and for which they showed a certain respect. Tours were organized, both above and below ground. Self-guiding placards marked the craters from 1000kg bombs and the deep craters in the earth resulting from the penetration of the 42cm shells. Senior officers from all branches of service, among them the Hungarian General Vitéz visited the fort.

In the course of one of these visits, the commanders of the two batteries of giant mortars that had shelled the fort each tried in turn to take credit for the rounds that had scored hits. In fact, for the few days of combat before the Armistice, the Schoenenbourg defence work had served the Germans as a marvelous “test-case” for future campaigns. The victors carefully researched the extent of the damage.

They carefully studied the fort itself, its structure and its surroundings. They went as far as taking very precise hydrological and geological readings. And showing some sense of humor, they catalogued the frog who had taken up residence in the outflow pipe of the spring which cut through the lower part of block 6. With Alsace annexed to the Reich, the Hitlerjugend organization made its young adherents visit the Fort regularly. Then things settled down, since the first setbacks for the Wehrmacht were taking place. The mighty German industrial complex was not keeping up with the insatiable appetite of the German war machine. As a result, the Germans relied on the productive capacity of the conquered countries. Large amounts of French equipment and supplies were immediately rounded up and re-used.

At the Schoenenbourg fort, the Germans took out two of the four Sulzer motors, to be re-used at unknown locations. A good deal of ventilation equipment, with its motors, was similarly un-installed and stockpiled at the barracks in Lembach, then shipped out to an unknown destination. The refill pump for the water tank in the front depot part of the gallery was found somewhere else, as was the “normal air” ventilator from block 1, whose motor had been mounted on the camp pump. Next, the engine of the Vetra tractor-train disappeared (it seems that the second engine was not taken), and one of the two step-down motors from the traction substation was lifted, although the electrical cable for the trolley was left in place. In the machine room's workshop, the turret lathe was dismantled and taken outdoors, along with the drill press. Strangely, this was offset by the addition of a turret lathe of German manufacture, which was later shown to be incomplete.

Outside, the anti-tank barrier, whose six rows of implanted rails stretched as far as the eye could see, was torn out. The thousands of tons of good steel that were gleaned were melted down in the blast furnaces of the Ruhr. Next, the military phone cables were dug up. Miles of cable were scavenged, to recover the copper and lead. The transformer station for the workshop near the men's entry was dismantled. However, the large electric supply cable that connected the Fort to the outside world remained intact.

Without going too much into details, the reported effects from this bombardment were as follows.

- block 1: one dual machine gun buckled by the concussion of a heavy bomb. After being unavailable for 45 minutes, this gun was repaired on the forge in the fort's workshop by Adjutant Jouan. No other damage in the block.
- block 2: no damage in the block. Nonetheless, below ground, the switch panel was put out of order by the vibration resulting from the explosions.
- block 3: 42cm shell hit the reinforced concrete platform over the block, causing a bathtub-sized gouge but no penetration.

Summer 1944, the Allied armies were rolling across France. The Wehrmacht was in constant retreat, and unable to hold. On 23rd November 1944, the French flag few again on Strasbourg. But the advantage of surprise was no longer a factor, and the pace of the American advance towards the Palatinate was rather labored. Even though the people of Strasbourg had been savouring their newfound freedom for about three weeks, the refinery at Pechelbronn [a small village some km northwest of the fort] was still running for the benefit of the Reich. Since the commercial power grid of northern Alsace had been partially disconnected or damaged, the two Sulzer motors from Schoenenbourg fort supplied the refinery with electric power.

A few adjustments was all it took, and they ran perfectly well. The motors continued to run until 15th December 1944, and that was it, since German resistance melted away after the fall of Haguenau on the 11th. The Americans arrived in the town of Soultz, about a mile and a half from the fort, on 15th December, and made it to the German border on the 16th.

At the end of December, Alsace was liberated, but not for long. Starting at the very beginning of 1945, operation Nordwind enabled the Germans to retake part of the ground they had lost. On 6th January, the Americans organized a line of resistance anchored on the Maginot Line. Since the winter was particularly raw that year, elements of the US 79th infantry division guarding the road to Wissembourg took turns seeking shelter under the armored shells of the combat blocks of the Schoenenbourg fort. One GI, undoubtedly impressed by the fresco of a driver in block 1, carved below it a small inscription dated 1th January 1945.
Dug in on the ridge line which dominates the hollow in which the village of Ingolsheim is nestled, the Americans fired without letup on anything that moved. The German 245.ID which opposed them and which had previously occupied positions on the Siegfried Line, was the least capable unit in the Lauter sector, and consequently the Germans did not succeed in taking the village. It was not until 20th January that the Germans could move forward again, taking advantage of the American pullback from the Hatten-Rittershoffen pocket, and of the general fallback. The Schoenenbourg defence work would fall once more into German hands, this time until 18th March 1945. However, the Germans understood that their gains did not signal victory. Since the Americans would certainly be trying their old tricks again, it was important to the Germans to keep them from once more seizing the Maginot Line.

Tons of explosives were stockpiled near the forts in northern Alsace. The German scouts had orders not to leave intact a single Maginot fortification between Lembach and Hunspach, to remove any major obstacle on the important line of communication linking Wissembourg and Haguenau. All the positions in this sector of the Maginot Line capable of directing fire against the main highway were blown up, along with the troop shelter at Schoenenbourg. The big forts, however, were another thing altogether. Blowing them completely would take weeks. Instead, the demolition teams would render the forts inactive and inaccessible by dynamiting their entryways and destroying both their weapons and their electrical generating capability.

At the Schoenenbourg fort, the Germans hurriedly dismounted the barrels of the two 75mm guns in block 3 and carried them outside. They overlooked, however, the two spare tubes that were kept held in their mount on the lower level of the block. Since dismounting the guns of block 3 had been judged to be too much work, the Germans contented themselves with sabotaging the 75mm guns in block 4. Undoubtedly they were leery of doing much more, because 500 fuzed shells filled the turret and its immediate area. The MGs turret of block 2 was also put out of action, this time with the aid of explosives. The charge was not a large one, but it was enough to immobilize the shaft of the turret in the "up" position.

In the infantry blocks 1 and 6, the breech blocks of the anti-tank guns were removed. Meanwhile, the demolition men got busy in the machine room, where they placed charges against the two Sulzer motors. The explosives went off with a terrible roar. The shock wave travelled first along the area in which the motors were mounted, then into the cross-corridors, and ended up by mangling the first airlock door. On the left side, the explosion surged into the pit where the cooling water tanks were located, destroying the CLM [Compagnie Lilloise des Moteurs - now a part of Peugeot] motor along the way. The first holding tank was hit on the side, and the others took the blast wave from the top. All the covers were bowed in, and are convex toward the bottom (which is still visible today).

On the right of the motor mounting area, the blast wave wrecked all the ductwork of the main ventilation system. Nothing remained of the big conduits but a tangle of shredded sheet metal work. When the smoke cleared in the machine room, one of the Sulzer motors was completely unusable. The second, a back-up, did not suffer too badly, since it appears that the charge did not go off. As evidence of this, it ran again in 1946. The electrical switch panel was intact, but the connector panel located near the center of the explosion was pulverized.

The underground explosions had scarcely subsided when those that were to devastate the two entryways were set off. At the ammunition entry, the Germans had placed a large quantity of explosives in the hallway/unloading area that was protected by the armored door, as well as in the dry moat under the rolling bridge [this gangway, when retracted, cut off entry to vehicles]. Setting off these charges caused another hellish explosion. In the unloading area, chunks of reinforced concrete were ripped off and thrown in all directions. As it roared through, the shock wave destroyed the cages of the two ammunition hoists as well as the heads of its stanchions. The huge armored door was twisted like a piece of straw. A dozen or so feet from there, the second charge pulverized not only the protective moat and the retractable gangway but also the thick wall overhanging it all. The Tourtellier monorail in the front hall was ripped from its mounting, and the grillwork over the entryway was completely wrecked. Thus the Germans achieved their purpose at the Munitions Entrance. The 1947 report of the Engineers described it in these terms, "block blown up, three-quarters destroyed," adding in addition that in 1947, the firing chamber was still inaccessible, obstructed by blocks of reinforced concrete.

At the men's entry, the result was even more definitive. Here the Germans satisfied themselves by Stuffing the zig-zag portion of the entry corridor with explosives. The huge explosion tore out the front wall of the entry, which was thrown outside. The floor was now just a big hole, through which the blast wave reached down to the next lower level. Above the center of the explosion, the concrete layer was cracked all the way through, and huge fissures radiated out to the edges of the block. The shock wave cracked the shaft connecting with the next level up, destroying as is passed all the ventilation ductwork, as well as the cage and the stanchion of the ammunition hoist. The blast wave finally died out some 20m farther on, but not without first having damaged the electric panel under the block and caved in the oil reservoirs in the transformer area.

As they fell back towards the north, the Germans left in their wake a fortification that had been mutilated and, as they had intended, was unusable for a good while. It didn't make much difference, since elements of the 141st regiment of the US 36th infantry division, which on 20th March 1945 were moving forward without encountering resistance between Schoenenbourg and Ingolsheim, were not much interested in stopping at the Maginot Line. In
effect, the Americans and the French forces of the 3rd Algerian Infantry Division had entered Germany the day before, and the German front line had been broken since the 16th March.

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