Change Log - Fusion 4.4

Summary

- New game engine features
- Balance changes
- Reminder: Fusion 4.3 data
- Performance improvements
- Bug fixes

New features

Protection and cover

Terrain now gives protection to your units. A unit in cover receives **less damage**. It is also **more difficult to hit** because its target profile is smaller.

These rules apply to infantry, guns, and vehicles.

Cover types

The first value is the damage reduction. The second value is the target profile reduction.

Cover	Infantry	Guns	Vehicles
Isolated trees (1 or 2 trees)	−10% / −20%	−10% / −10%	None
Medium forest (3 to 7 trees)	−20% / −50%	−10% / −30%	0% / −10%
Dense forest (8 trees or more)	−30% / −75%	−15% / −50%	0% / −20%
Small object (well, small rock)	0% / −20%	None	None
Large object, large rock, hill	−20% / −40%	−10% / −15%	0% / −10%
Flat rocks, craters	−10% / −30%	−15% / −30%	None
Building	−20% / −50%	−20% / −20%	0% / −10%
Next to a vehicle or wreck	−20% / −50%	−20% / −20%	None

- Cover values do not add together. The game uses the best value.
- A prone soldier gets an additional −30% damage and −60% target profile in all locations.
- A building protects only units that are less than half a cell from its walls.
- A ruined building always gives protection. A fallen tree does not give protection.

- Infantry and guns that are directly next to a vehicle or wreck get the same protection as units near a building.
- The crew of a gun get the protection of the gun.
- Aircraft do not give protection. Vehicles do not protect other vehicles.
- A new crater gives protection. A filled crater that is disappearing does not give protection.
- A lying object gives protection only when the map blocks its own cell quarter, as under a rock. Flowers, dust, and snow heaps do not give protection.

"Get into cover" command

- The soldier moves to the nearest strong cover: a forest with 3 trees or more, a building, or a vehicle.
- If no strong cover is in range, the soldier selects the best cover in the nearby area.
- If no position gives better protection, the soldier stays in the current position.
- If you give the command to many soldiers, they do not all go to the same cover. A soldier avoids a cover that other soldiers already move to. The soldier goes to the next nearest cover.
- In a forest with 3 trees or more, the soldier searches up to 5 cells away. In other areas, the soldier searches up to 3 cells away.
- The soldier moves to the correct side of the cell. For example, the soldier moves next to a wall and not to the open side.
- The soldier avoids positions that are less than 2 cells from an object that can explode. These objects include tanks, storage tanks, and fuel or chemical containers.

Protection indication

- **C field.** At the bottom left, the **C** (cover) field shows the protection value of the unit under the pointer. The value is from 0 to 1000. Examples:
  - prone soldier in open terrain: 638;
  - prone soldier in dense forest: 1000;
  - tank in dense forest: 142.
- **White line.** A white line below the bars of selected allied units shows their protection.
- **Shield on the pointer.** The movement pointer shows a small shield above a cover position:
  - outline shield: light cover, such as an isolated tree, small object, rocks, hill, or crater;
  - solid shield: strong cover, such as a forest with 3 trees or more, a building, or a vehicle.
- The shield follows the selected units: infantry first, then guns, then vehicles. A tank alone gets no shield near a vehicle or on a crater.
- **"Get into cover" button.** The button shows a shield. The shield is an outline. It is solid while you push the button.

Armored vehicle crews

These rules apply to tanks, assault guns, tank destroyers, half-tracks, and anti-aircraft vehicles.

The goliath, the springer, and the V2 have no crew positions. They keep the rules of the original game.

No more "exit and re-enter" reload exploit

- Previously, an empty tank continued to reload. A crew could exit the tank and enter it again to fire immediately.
- Now, when a crew member exits a vehicle, the reload cycle starts again from zero. The same rule applies when a gun crew member leaves the gun.
- An empty tank does not reload.

Number of crew members

- Two crew members are enough to fire, open the hatch, and use binoculars.
- A crew member at the open hatch or at the binoculars does not drive and does not operate the gun.
- With 2 crew members and the hatch open, the other crew member works as one crew member alone. The hatch stays open.

One crew member in a tank

One crew member cannot drive and operate the gun at the same time:

- The crew member does not reload while the tank moves or turns its hull. A hull turn needs the driver's position.
- After the tank stops, the crew member stays in the driver's position. The tank can move again immediately.
- A fire request sends the crew member to the gun. A fire request is a Fire command or a target that the tank finds. The crew member needs 50 turns (about 2 seconds) at rest. The tank cannot fire during this time.
- The tank accepts an attack command during the change of position. It keeps its target.
- From the gun to the driver's position, the crew member also needs 50 turns. The tank does not move and does not turn its hull until then.
- The crew member turns the turret from the gun. A turret rotation does not stop the fire.
- The crew member reloads only one weapon at a time.
- The crew member does not open the hatch or use binoculars.

Buttons during a change of position

- A button that needs a position stays visible. You can click it. Its icon fades to a darker gray color.
- A click puts the command in the queue. Stop is always available.
- A Fire command ends the current movement command. The tank stops, goes to the gun, and fires when the weapon is ready. If the target is out of range, the tank first moves into range. With Shift, the command goes after the earlier commands.
- A repeated command for the same position keeps the countdown. A command for the other position starts a new change of 50 turns.

Incomplete crew

- An incomplete crew reloads and acquires targets more slowly. The multiplier is ×1.25 for each missing crew member, with a maximum of ×2. One crew member always uses ×2.
- Example for a 4-position tank: 3 crew members use ×1.25, 2 crew members use ×1.5, and 1 crew member uses ×2.
- The rate of fire during a burst does not change.
- Turret rotation and hull rotation stay at normal speed.

- After the main gun fires, the turret stays stationary for a longer time before it aims at another target. The multiplier is ×4 with one missing crew member. Each additional missing crew member adds another ×2. The maximum multiplier is ×10.
- The tank can still fire at a target that is already in line with the gun.
- One crew member, or two crew members in a moving tank, reload only one weapon at a time.

Crew indication on the screen

- Below the tank name, the unit window shows a helmet and the number of crew members aboard. For example: 3/4. The second number is the number of crew positions. The helmet is white when the crew is full. It is yellow when a position is empty. It is red when fewer than 2 crew members are aboard.

Status icons

When you select one of your vehicles, small icons next to its bars show its state. Each icon has a black outline.

- **Helmet, to the left of the bars.** It is yellow when one or more positions are empty. It is red when fewer than 2 crew members are aboard.
- **Three shells, to the right of the bars.** They show the main ammunition. They are yellow at 20% or less. They are red when the ammunition is empty.
- Tanks, tank destroyers, self-propelled anti-aircraft guns, and half-tracks show both icons.
- Anti-tank guns and anti-aircraft guns (szenit) show only the shells.
- Units of other players show no icon.

Survivors from a destroyed vehicle

- When a vehicle is destroyed, each crew member in the vehicle can survive.
- The survival probability is from 25% for a beginner to 30% for a veteran.
- A survivor is wounded. A serious wound can kill the survivor.
- A survivor keeps the same experience level. The survivor exits on a free cell next to the wreck and then runs away.
- Each passenger of a destroyed ground vehicle can also survive, with the same probabilities. They depend on the experience of the passenger. This includes a truck or a tractor that tows a gun. The crew rolls first.
- Passengers of an aircraft always die with the aircraft.

Infantry and medics

- **Precise movement click.** A soldier that you send to a cell stops in the cell quarter that you click. The marker shows this cell quarter.
  - Previously, the soldier stopped in the cell quarter through which the soldier entered the cell. If the soldier was already in the cell, the soldier did not move.
  - If another soldier occupies the selected cell quarter, the original movement behavior applies.
- **No experience from friendly fire.** A unit that is hit by its own side or by an ally does not get experience. This rule also applies to occupants of a building, vehicle, or gun.
- **Medic experience.** A medic gets experience only when the medic treats a wound caused by the enemy.
- **Medics in protected positions.** In a building, bunker, or vehicle, a medic treats wounds three times less frequently. Previously, the medic treated wounds much faster than outside these positions.

Guns

A gun in the original game always moves with its trail first. When it advances, it first turns its barrel away from the enemy.

- Now, at each step, the gun uses the direction that needs the smaller turn: barrel first or trail first.
- If the two turns are equal, the gun moves trail first, as before.
- The crew stay at the trail and face the direction of movement.
- A machine gun or a mortar that moves barrel first keeps 100% of its speed.
- Another gun that moves barrel first has 70% of its speed. These are anti-tank guns, field guns, howitzers, anti-aircraft guns, and rocket launchers.
- This rule applies to anti-tank guns, howitzers, mortars, machine guns, and anti-aircraft guns on a carriage.

Vehicles

Reverse movement

- A vehicle that can move in reverse uses reverse movement when both conditions are true:
  - the destination is behind the vehicle and not more than 45° to either side;
  - the destination is not more than 12 cells away. Previously, the limit was 4 cells.
- If one of these conditions is false, the vehicle turns around and moves forward.
- The selection is no longer random. The same command always gives the same movement.
- A vehicle that tows a gun does not move in reverse.

Binoculars for vehicles

Some vehicles can use binoculars in the same way as an officer. The button is in the same location as the infantry binoculars button. Only vehicles that have this function in their data can use the button.

- **Tanks, armored cars, assault guns, and tank destroyers.** If the vehicle can open its hatch, the commander opens the hatch to observe. If the vehicle cannot open its hatch, it observes with the hatch closed.
- **Half-tracks, anti-aircraft vehicles, light cars, and motorcycles.** The vehicle observes with the hatch closed.

During observation:

- A moving vehicle stops before it starts to observe. If you use Shift, the vehicle observes after it reaches its destination.
- The turret continues to fire at visible targets.
- If an enemy is close, the observation command changes to an attack command.
- Weather reduces the observation range in the same way as for infantry.
- A new command stops observation.
- An incoming hit, the B key, or loss of the crew closes the hatch and stops observation.

Supply trucks

- Supply trucks use spare parts, not ammunition, to repair vehicles.

- Ammunition supply does not change.

Aircraft and paratroopers

- **Wider paratrooper dispersion.** An aircraft drops a maximum of one paratrooper in each cell. Each paratrooper can land about 2 cells from the aircraft. This distance is two times greater than before.
- **Crew of a shot-down aircraft.** When an aircraft is shot down, each crew member aboard can jump with a parachute.
  - The probability is from 20% for a beginner to 40% for a veteran.
  - A survivor is wounded, as a vehicle crew member is. A serious wound can kill the survivor.
  - One survivor jumps in each turn while the aircraft falls.
  - Passengers of the aircraft always die with it.
- **Pilot surrender.** A pilot that lands with a parachute can surrender. Every 64 turns, the pilot rolls when an enemy unit is within 192 pixels (6 cells) and no friendly unit is within 192 pixels.
  - The probability is from 10% (highest morale) to 90% (lowest morale).
  - The pilot then goes to the player of the nearest enemy unit.
  - A saved game does not keep these pilots. After a load, they cannot surrender.

Interface

- **Action grid.** The olive background is darker and quieter. The icons are clearer and sharper.
- **Frames.** The panel at the bottom left and the status strip have a metal frame with rivets.
- **Name frame.** At the top left, the unit name frame now uses the same style as the panel at the bottom left. It has a dark olive background and thin gray lines. This style also applies to desert maps.
- **Protection and crew.** The C field, white line, pointer shield, helmet, and status icons are described in the sections above.

UI scale (`UIScale`)

- The `UIScale` key in the `[Game]` section makes the in-game UI elements larger. Example: `UIScale=1.5`. The default is `1`, which is the original UI.
- The battlefield and the M map keep their size.
- The file limits the value. The UI keeps a minimum of 800 × 600 logical pixels. At 1920 × 1080 pixels, the maximum value is 1.8.
- The file rounds the logical screen down to a multiple of 16 × 8 pixels. The real scale can thus be a little larger than the value.
- Each player can use a different value, because the scale does not change the simulation.

Group panel

- Ten cells at the top right show the control groups 1 to 9 and 0. A group that holds units has a lit cell. The unit count is below the cell.
- Small badges show the units in a building, the drivers, the passengers, and the gun crews.
- A left click selects the group. A right click assigns the selection to the group. Alt and a digit select the group.
- The panel is visible only while a group holds units. Alt+Y hides it with the rest of the UI.

- The `GroupPanelCount=off` key removes the unit counts.

Zeppelin panel

- In a network game with zeppelin groups, the panel shows the groups that your team does not hold yet.
- It appears at the start of the mission for 10 seconds. The P key shows it again for 10 seconds.
- Each row shows the zeppelins that your team holds, for example `2/3`, then the color of the group. When your team holds all the zeppelins, the row shows the time until the capture.
- The `ZeppelinPanelBehaviour=toggle` key keeps the panel on the screen from the start of the mission. The key then hides it and shows it again.
- A `key_Zeppelin` line in `Key.map` changes the key, for example `key_Zeppelin 4B K`. The original game ignores this line.

Multiplayer auto-save

- In a network game, the host saves the game every 240 seconds. The game of each player writes its own copy under the same name.
- The name is the start date and time (`DDMMHHMM`) and a number of 2 digits, for example `1010211601`. The number increases every 30 minutes. Between two numbers, each save writes over the previous save.
- The Delete key, or a click on the indicator in the top-left corner of the minimap, stops the saves. The indicator is green while the saves run. It is red when they stop. Another push starts the saves again under a new name.
- When a player leaves the game or loses the connection, the saves stop. The last good save thus stays unchanged.
- The `AutoSaveMulti=0` key stops the saves. The `AutoSaveMultiSeconds` key sets the time between two saves (60 to 3599 seconds).
- Only the host needs this file for the saves.

Ping markers on the M map

- A ping (Ctrl and a left click on the minimap) also puts a ring on the M map. The ring has the color of the player who sent the ping. It stays for 15 seconds.
- A player can send 5 pings in 5 seconds. The game ignores the next ping until 5 seconds after the first.
- The general signal also puts a ring on the M map. To send it, open the chat, push Ctrl and left click on the minimap, then send the message. The sender and each recipient of the message, ally or enemy, see the ring.

Ally names

- While you hold the J key, each allied unit on the screen shows the name of its player below its bars. The name has the color of the player and a black outline.
- The game shows the names of infantry, vehicles, and guns that your team can see. It does not show names for aircraft, for your units, or for enemy units.
- When the names of two units of the same player touch, the game shows only one name.
- An observer sees the names of all the players.
- The key does nothing while the chat line is open.

- A `key_AllyNames` line in `Key.map` changes the key, for example `key_AllyNames 4B K`. The keymap screen of RUI writes this line.

Chat font

- The chat messages, the other message lines, and the input line use the Courier Prime Condensed font at 15 pixels. The names of the allies use the same font at 14 pixels.
- Each letter has a black outline. The colors do not change.
- An old message fades out, as in the original game.
- The caret of the input line is a vertical bar after the last letter.
- The other text boxes keep the original font.

Smooth scroll

- The view moves on each frame of a scroll, as in pause. Previously, the view stopped on the frames that run a turn and then jumped. The scroll was smooth only with one vehicle selected or in pause.

Zone marks on the M map

- You can assign a screen zone to each key from Ctrl+F1 to Ctrl+F8. The key F1 to F8 then moves the view back to that zone.
- The M map shows the number (1 to 8) of each assigned zone at the center of that zone. The number is white with a black outline.
- A zone that you did not assign shows no number.
- The numbers show in a solo mission and in a multiplayer game.

Unit balance

This section lists the balance changes of version 4.4: damage, fixed guns, sight, binoculars, speeds, ammunition, health points, explosions, and ranges.

Damage handling

Major change to the damage handling.

This applies only to the damage types PIERCE and TRANSPIERCE (most guns and tanks that fire direct).

Expected effects to observe and judge:

- "Heavy" gun against a "small, lightly armored tank": the tendency is to destroy it in one shot, and the damage is unchanged (example: SU100 against a PzIII).
- Gun with a PEN moderately above the ARMOR of the tank: the shell still pierces, but the damage is moderately lower (example: PzIV H against a T34/85 and the opposite, or a 76 mm Sherman). Generally, you now need 3 hits to destroy the tank (from the front!).
- PEN only just above the ARMOR: the shell pierces, but the damage is lower (example: the Russian 85 mm or the 75 mm pak40 from the front against a Tiger 1: you need 5 to 8 hits to destroy it).
- To flank is more important. A tank takes much more damage from a shot on the side than from the front when the armor is very different. This is better, because it simulates hits on the "vital parts" that are harder

to reach from the front.

Fixed guns: health points and armor

Change to the resistance and the health points of the "fixed" guns (MG, AT guns, and so on). The values are now consistent.

Health - 76 files changed:

- Machine guns: 100 → 80 HP: 11 files.
- Light and medium mortars: 100 → 80 HP: 12 files.
- Heavy mortars: 160mm.mortar 140 → 180 HP; jrmortar 100 → 180 HP.
- AT guns: 140 → 180 HP: 19 files.
- Light AA guns: bofors and 37mmflak 140 → 180 HP.
- Heavy AA guns: 340 → 240 HP: 7 files.
- Light and medium artillery → 180 HP: 11 files (105-mle and m2/m30-m38 change from 340 → 180; the others from 140 → 180).
- Heavy artillery → 240 HP: 12 files. The initial values were 340 HP, except br-18, which changes from 700 → 240 HP.

ARMOR - harmonized profile applied to the exposed guns concerned

This profile applies to the machine guns, mortars, AT guns, AA guns, and exposed artillery concerned, and to the Nebelwerfer 150 mm and 210 mm.
All these guns are now moderately more resistant to 12.7 mm, 15 mm, and 20 mm fire. This also increases the probability that the gun runs out of ammunition instead of being destroyed.

For the coastal installations, only those with a protection below the agreed floor were harmonized: cost_105, cost_305, and 280mm.4caponier. Their Health is unchanged.
The casemates that are already well protected (cost_180, 280.2, cost_280) are unchanged. The Calliope, Katyusha, and other rocket launchers on vehicles are also unchanged.

Lines of sight

Change to the lines of sight: fields of view 4.3 > update proposed for 4.4.

Unit type	View "inside"	View "outside"	Total
Standard closed tank	14 > 15	+11	25 > 26
Tank historically dedicated to reconnaissance	19 > 21	+8	27 > 29
Open combat vehicle	20 > 21	+5	25 > 26
Closed recon vehicle	20 > 22	+8	28 > 30
Open recon vehicle	24 > 26	+4	28 > 30
Recon vehicle without exit	28 > 30	—	28 > 30

Other vehicle without exit	25 > 26	—	25 > 26
Motorcycle / sidecar	28 > 30	—	28 > 30
Standard infantry and AT/AA guns	28 > 30	—	28 > 30
Sniper	29 > 31	—	29 > 31

Tanks specifically recognized as historically dedicated reconnaissance vehicles, put in the matching category:

- Pz II L Luchs (Germany)
- Pz 38(t) reconnaissance version (Germany)
- Stuart reconnaissance version (UK and USA)
- T-40 amphibious (USSR)
- Late BT-7 45mm (USSR)

Reconnaissance binoculars

HS2 Fusion - Changelog: reconnaissance binoculars

The binocular system is added to 32 reconnaissance units. This increases their role in the detection and the observation of the battlefield.

- **Light reconnaissance tanks (6) - binocular 34 26.** Luchs, Aufklärungspanzer 38(t), T-40, BT-7, American and British Stuart.
- **Armored cars and reconnaissance vehicles (23) - binocular 35 26.** AB41, BA-10, BA-20, BA-3, BA-64, Daimler, Greyhound, Humber, Panhard 178, Puma, Sd.Kfz. 222/231/234, Sd.Kfz. 250/251, Willys Jeep, Dingo, Sumida, and other variants.
- **Reconnaissance motorcycles (3) - binocular 39 16.** Zündapp KS750, TIZ-AM-600, BMW R75.

Total: 32 units have binoculars. The parameters are different for each category.

Gun movement speed (movespeed)

HS2 FUSION - MOVESPEED CHANGELOG (lang44B)

Source: lang44B(1).zip

- Scope: only the UNITS sheets of the approved list.
- Rule: two identical speeds, 0.10 to 0.50 in steps by weight.
- Exception: puppe = 0.50 0.50.
- No change to soldtomove, maxgund, or the other parameters.
- Only the sheets whose movespeed changes are in this archive.
- Units examined: 52
- Sheets changed: 52
- Sheets already correct, not included: 0

Weight grid (kg) → movespeed

Weight (kg)	movespeed
<=100	0.50 0.50
101-350	0.45 0.45
351-650	0.40 0.40
651-1000	0.35 0.35
1001-1500	0.30 0.30
1501-1800	0.25 0.25
1801-2200	0.20 0.20
2201-2800	0.15 0.15
2801-9999	0.10 0.10

Changes (name | weight kg | old movespeed → new movespeed)

Name	Weight (kg)	Old movespeed	New movespeed	Note
70mmlight	212	0.5 0.6	0.45 0.45	
f-22-usv	1620	0.1 0.1	0.25 0.25	
f_bofor	1140	0.4 0.5	0.30 0.30	
gun_95	945	0.45 0.5	0.35 0.35	
gun_inf	400	0.5 0.6	0.40 0.40	
m1a1	653	0.4 0.5	0.35 0.35	
nebel6_210mm	1100	0.3 0.3	0.30 0.30	
17p	2923	0.3 0.4	0.10 0.10	
2pdr	800	0.5 0.6	0.35 0.35	
3inch_m5	2210	0.3 0.4	0.15 0.15	
47_boehler	315	0.5 0.6	0.45 0.45	
53-k	560	0.5 0.6	0.40 0.40	
6pdr	1145	0.3 0.4	0.30 0.30	
75mount	1560	0.4 0.5	0.25 0.25	

77fieldgun	1560	0.3 0.4	0.25 0.25	
kr_pak40	1425	0.3 0.4	0.30 0.30	
m3a1	413	0.5 0.6	0.40 0.40	
pak35-36	327	0.5 0.6	0.45 0.45	
pak38l-60	986	0.3 0.4	0.35 0.35	
pak40	1425	0.3 0.4	0.30 0.30	
pak41	1390	0.2 0.2	0.30 0.30	
puppe	146	0.5 0.55	0.50 0.50	EXCEPTION PUPPCHEN
type.01	753	0.5 0.6	0.35 0.35	
zis-100	3650	0.1 0.1	0.10 0.10	
zis-2	1250	0.3 0.4	0.30 0.30	
zis-3	1116	0.3 0.4	0.30 0.30	
37mmflak	1550	0.45 0.55	0.25 0.25	
bofors	1981	0.45 0.55	0.20 0.20	
type.88	3355	0.1 0.2	0.10 0.10	
breda	<100	0.55 0.6	0.50 0.50	
ds39	<100	0.55 0.6	0.50 0.50	
hotchkiss	<100	0.55 0.6	0.50 0.50	
maxim	64	0.55 0.6	0.50 0.50	
mg34	12.1	0.55 0.6	0.50 0.50	
mg40	19	0.55 0.6	0.50 0.50	
mg42	11.6	0.55 0.6	0.50 0.50	
mgjap	<100	0.55 0.6	0.50 0.50	
vickers.f	18.1	0.55 0.6	0.50 0.50	
107mm-m2	151	0.45 0.5	0.45 0.45	
120.jap	248.8	0.45 0.5	0.45 0.45	

120mm-gr-42	280	0.45 0.5	0.45 0.45	
150.jap	350	0.45 0.5	0.45 0.45	
160mm.mortar	1170	0.1 0.2	0.30 0.30	
81.jap	23.6	0.5 0.55	0.50 0.50	
81.mle	58.5	0.5 0.55	0.50 0.50	
81mm-m1	61.7	0.5 0.55	0.50 0.50	
82mm	56	0.5 0.55	0.50 0.50	
8cm.mortar	57	0.5 0.55	0.50 0.50	
90.jap	159	0.5 0.55	0.45 0.45	
jrmortar	227	0.45 0.5	0.45 0.45	
ml_3ins	50.8	0.5 0.55	0.50 0.50	
ml_4ins	147	0.45 0.5	0.45 0.45	

Already correct - not changed / not included

None.

Notes

- The weights and the historical matches come from the list that the user supplied. There was no new historical check.
- The weapons that are not in the list are strictly excluded from this archive.
- The original and new speeds are the exact text values of the sheets.
- The user list contains 52 distinct identifiers (and not 53 as stated before).

End of the changelog.

Ammunition of the 21 fighters (useammo)

HS2 Fusion v4.4b - useammo change for the 21 fighters

Source: LANG44B1010.zip

Only the fields shot_air_useammo and shot_grn_useammo changed. The fields ammo and burstshots, and all other sheets, are unchanged.

Unit	shot_air_useammo	shot_grn_useammo
a-6m	2 → 0	2 → 0

a-6m_typ97	2 → 0	2 → 0
n1k1	4 → 0	4 → 0
ki-27	2 → 0	2 → 0
bf-109	1 → 0	1 → 0
fw-190	2 → 0	1 → 0
me-262	4 → 0	4 → 0
curtiss.warhawk	8 → 0	8 → 0
p-51	6 → 0	6 → 0
corsair	6 → 0	4 → 0
spitfire.mk-xvl	4 → 0	2 → 0
hurricane.mk-l	4 → 0	2 → 1
mosquito_j	4 → 0	4 → 0
jak-3	2 → 0	1 → 0
la-5	2 → 0	1 → 0
il-2	2 → 0	2 → 1
il-2_23mm	2 → 0	2 → 0
i-16	2 → 0	2 → 0
re2000	1 → 0	1 → 0
d520	4 → 0	1 → 0
ms406	2 → 0	1 → 0

Health points of heavy armored vehicles

HS2 FUSION - HEALTH (HP) CHANGELOG

Source: LANG44B1010(2).zip

Change: health only - 21 UNIT files.

UNIT	BEFORE	AFTER	DELTA
ger_su85	1100	950	-150

is-1	1100	950	-150
isu-122	1100	950	-150
isu-152	1100	950	-150
jagdpanther	1100	950	-150
kv2_ger	1100	950	-150
pershing	1100	950	-150
tiger	1100	950	-150
tiger_sat	1100	950	-150
elefant	1350	1100	-250
ferdinand	1350	1100	-250
is-2	1350	1100	-250
koenigstiger	1350	1100	-250
kt2	1350	1100	-250
sturmtiger	1350	1100	-250
jagdtiger	1400	1150	-250
is-3	1450	1100	-350
e100	1600	1300	-300
maus	1600	1300	-300
t95	1600	1300	-300
karl	4500	4200	-300

Exception: the IS-3 is aligned with the Tiger II (1100 HP). No other parameter changed.

Explosion when a fixed gun is destroyed (dieexplosion)

HS2 FUSION - dieexplosion high_end added

Source: lang44B121026(1).zip

Only the fixed guns that had no dieexplosion before.

Unit	Category	Description	dieexplosion

107mm-m2	Mortier	mortier US (107mm M2)	(absent) → high_end
120.jap	Mortier	mortier Japonais (120mm Type 2)	(absent) → high_end
120mm-gr-42	Mortier	mortier Allemand (120mm Gr.W.42 L/15.5)	(absent) → high_end
150.jap	Mortier	mortier Japonais (150mm Type 93)	(absent) → high_end
17p	Canon AC	canon antichar Brit. (76mm Mk.V / moyen)	(absent) → high_end
2pdr	Canon AC	canon antichar Brit. (40mm Mk.IX / leger)	(absent) → high_end
37mmflak	DCA	canon DCA Allemand (37mm / leger)	(absent) → high_end
3inch_m5	Canon AC	canon antichar US (76mm M5 / moyen)	(absent) → high_end
47_boehler	Canon AC	canon antichar Italien (47mm / tres leger)	(absent) → high_end
53-k	Canon AC	canon antichar Soviet. (45mm / leger)	(absent) → high_end
6pdr	Canon AC	canon antichar Brit. (57mm Mk.II / leger)	(absent) → high_end
70mmlight	Artillerie	obusier Japonais (70mm / tres leger)	(absent) → high_end
75mount	Canon AC	canon antichar (75mm M97/T41 / leger)	(absent) → high_end
77fieldgun	Canon AC	canon antichar Japonais (75mm / leger)	(absent) → high_end
81.jap	Mortier	mortier Japonais (81mm Type 99)	(absent) → high_end
81.mle	Mortier	mortier Francais (81mm M27/31)	(absent) → high_end
81mm-m1	Mortier	mortier US (81mm M1)	(absent) → high_end
82mm	Mortier	mortier Soviet. (82mm PM 41 L/10)	(absent) → high_end
8cm.mortar	Mortier	mortier Allemand (80mm Gr.W.34 L/14.1)	(absent) → high_end
90.jap	Mortier	mortier Japonais (90mm Type 94)	(absent) → high_end
bofors	DCA	canon DCA Bofors (40mm M34 / moyen)	(absent) → high_end
gun_95	Artillerie	obusier Brit. (95mm Mk.II / tres leger)	(absent) → high_end
jrmortar	Mortier	mortier lance-roquettes Japonais (200mm)	(absent) → high_end
kr_pak40	Canon AC	canon antichar Croate (75mm / moyen)	(absent) → high_end
m3a1	Canon AC	canon antichar US (37mm M3A1 / tres leger)	(absent) → high_end
ml_3ins	Mortier	mortier Brit. (76mm Mk.II)	(absent) → high_end

ml_4ins	Mortier	mortier Brit. (102mm Mk.I)	(absent) → high_end
pak35-36	Canon AC	canon antichar All. (37mm / tres leger)	(absent) → high_end
pak38l-60	Canon AC	canon antichar Allemand (50mm / leger)	(absent) → high_end
pak40	Canon AC	canon antichar Allemand (75mm / moyen)	(absent) → high_end
pak41	Canon AC	canon antichar PaK41 Gerlich 75mm (Leger)	(absent) → high_end
puppe	Antichar (Püppchen)	Puppchen (roquettes 88mm / tres leger)	(absent) → high_end
type.01	Canon AC	canon antichar (47mm APX/Type 1 / leger)	(absent) → high_end
zis-2	Canon AC	canon antichar Soviet. (57mm / leger)	(absent) → high_end
zis-3	Canon AC	canon antichar Soviet. (76mm / leger)	(absent) → high_end

The delay of the high_end explosion is shorter.

TOTAL: 35 UNIT changed.

Truck speed

The speeds of the "moderate" trucks are set to a common value of 1.55. This prevents a disadvantage at the start of a multiplayer game, depending on the nation. The trucks set to 1.55 are:

- the British Bedford QL
- the US Dodge and the ambulance of the same type
- the Russian Zis-5 and the ambulance of the same type
- the German Mercedes-Benz
- the Japanese Isuzu type 94

Range of armor and AA guns

This part compares version 4.21 with version 4.4. Some of these changes possibly come from version 4.3.

- The range is in game pixels.
- Reference values in 4.4: a T-34/85 fires at 915, a Tiger at 940, a Panther at 955, and a Tiger II at 975.
- This part gives only the decreases of 5% or more. For the other armored vehicles, the range changes from +2% to −5% compared with 4.21.

Heavy AA guns

Against ground targets, heavy AA guns lose 6% to 10% of their range compared with 4.21. Most of them now fire at 940, the same as a Tiger.

Unit	4.21	4.4	Change
Sd.Kfz.8 AA (88mm FlaK18), the "Buffla"	1050	940	−10%

German AA gun (88mm)	1050	940	−10%
British AA gun (94mm Mk.VI)	1050	940	−10%
Japanese AA gun (88mm Type 99)	1050	940	−10%
Soviet AA gun (85mm KS-12)	1050	940	−10%
US AA gun (90mm M2)	1050	940	−10%
German AA gun (88mm long)	1054	975	−7%
AA gun (75mm L55/Type 5)	980	925	−6%

- In 4.21, heavy AA guns fired at 1050 against ground targets. They thus hit tanks before the tanks could fire back. In 4.4, they fire at the same distance as heavy tanks.
- Compared with 4.21, fire against aircraft does not change, for all AA guns.
- Compared with 4.21, the range of light AA guns, towed or self-propelled, does not change: 12.7 mm, 20 mm, 37 mm, 40 mm, Kugelblitz.

Assault guns

Five assault guns now fire at 930. In 4.21, they fired at 1080 to 1200, farther than all tanks. They can no longer fire from behind your tanks, out of range of the enemy tanks.

Unit	4.21	4.4	Change
KV-2A assault gun (152mm)	1200	930	−22%
Brummbär assault gun (150mm)	1200	930	−22%
M4A3 HVSS assault gun (105mm)	1100	930	−15%
M8A1 assault gun (75mm)	1080	930	−14%
Matilda Mk.II assault gun (76mm)	1080	930	−14%

The sixth assault gun, the Churchill AVRE (290mm), keeps its range of 800.

Other changes to these six units, compared with 4.21:

- Dispersion: 85 / 50, instead of 170 / 130 (KV-2A, Brummbär) or 178 / 115 to 178 / 120 (the others). They thus aim approximately two times better.
- Dead zone: 100 for all of them. It was 240 (KV-2A, M4A3, M8A1, Matilda), 120 (Churchill AVRE), and 60 (Brummbär). The Brummbär thus cannot fire at targets as close as in 4.21. The others can fire at closer targets.
- View: 15, the same as a closed tank, instead of 10 / 11. The M8A1, an open vehicle, changes from 19 / 20 to 21.

- For the KV-2A, the Brummbär, the Churchill AVRE, and the M4A3, the dispersion and the dead zone are already in the "Large howitzers in direct fire" part of the 4.3 reminder.

Advice:

- Put them with your tanks or just behind them. Farther back, they are out of range.
- Use their high-explosive shells against occupied buildings, anti-tank guns, infantry, and light vehicles. Leave the enemy tanks to your tanks.
- The KV-2A and the Brummbär cause the most damage: 840, against 590 for the M4A3 and 420 for the M8A1 and the Matilda.
- All of them, except the M8A1, reload approximately three times more slowly than the M8A1. Give them a specific objective.
- The M8A1 has few hit points (375). Keep it behind your tanks.

German short guns

Armored vehicles with the German short 75 mm gun (KwK 37 and StuK 37) now fire at 825. In 4.21, they fired at 905 (935 for the StuG III/E). In 4.4, their range is 90 to 150 less than a T-34/85, a Tiger, a Panther, or a Tiger II.

Unit	4.21	4.4	Change
Sd.Kfz.142 StuG.III/E (75mm StuK37)	935	825	−12%
Sd.Kfz.161 Pz.IV/D (75mm KwK37)	905	825	−9%
Sd.Kfz.161 Pz.IV/E (75mm KwK37)	905	825	−9%
Sd.Kfz.161 Pz.IV/F (75mm KwK37)	905	825	−9%
Sd.Kfz.161 Pz.IV/E, Italian (75mm KwK37)	905	825	−9%
Sd.Kfz.141/2 Pz.III/N (75mm KwK37)	905	825	−9%
Sd.Kfz.161 Minenräumer IV (75mm & mine clearing)	905	825	−9%

- In a long-range duel, these vehicles have a disadvantage against tanks with a long gun.
- Use them to support infantry, at short range or from an ambush.

Other armored vehicles: decreases of 5% to 8%

These units lose 5% to 8% of their range compared with 4.21. Their role does not change.

Units	4.21	4.4	Change
B1-Bis (75mm & 47mm), 75 mm gun	900	825	−8%
ISU-152 Mod.44 (152mm ML-20S)	980	900	−8%
SU-152 Mod.43 (152mm ML-20S)	980	930	−5%

M10 GMC, M10 GMC lend-lease, M10 Wolverine (76mm M7)	980	925	−6%
T-34/76A, B, C, and E, T-43 prototype, ATO-41 (76mm)	925	875	−5%

- The T-34 tanks with the 76 mm gun now fire at 875. This is 40 less than a T-34/85 (915).
- The 47 mm gun of the B1-Bis changes from 880 to 850 (−3%).

Key points (compared with 4.21)

- Against ground targets, heavy AA guns no longer have a range advantage over heavy tanks. Against aircraft, nothing changes.
- Assault guns move with the tanks, not behind them. Use them against buildings, guns, and infantry, not against tanks.
- Vehicles with the German short 75 mm gun avoid long-range duels against long guns.
- The other armored vehicles keep their role.

Reminder: Fusion 4.3 data

Version 4.4 includes these changes from version 4.3. When the "Unit balance" section gives a different value, that value replaces the value in this section.

Rommel53 wrote this change log in August 2026. It describes the unit data files. These changes correct many inconsistencies in the original game and in Fusion 4.21b.

Figures of the comparison 4.21b → 4.3:

- 567 files changed (562 units, 3 explosions, 1 miscellaneous, 1 shot) and 1 file added (`SHOTS/grenade_at`). No file was removed.
- 3,372 values or lines changed, 153 lines added, and 126 lines removed.
- A unit comparator gives the values of each unit. It helps players and map makers. You can find it on the Discord, in the dedicated tab.

Penetration and armor

- Previously, the limits of the game engine were different at the top and bottom of the spread. The relation between armor and penetration was thus not predictable. It is now stable.
- A tank with 150 mm of front armor resists a 145 mm gun that fires from the front (0°).
- The engine calculates a shot at 45° with 50% of the front armor and 50% of the side armor. The same tank can thus be penetrated by a shot at 20° or 40° from the side.

Gun penetration and range

- The game uses the DeMarre formula, minus 5%, at 500 m and 0°. The national test tables give values that you cannot compare, because each country uses its own test rules.
- The minus 5% is there because the formula gives too high a value for real penetration.
- 500 m is a common combat distance in HS2. The angle is 0° because the angle bonus is already in the armor of each tank.

- Each value uses the shell that the model uses most.
- Early T-34 tanks have a small penalty. In 1940-1941, their shells had very soft steel.
- At very short range, the game engine adds a random penetration bonus.

Armor

- The engine has only 3 armor values: front, side, and rear. Each value covers the complete face, hull and turret together.
- The effective armor is the real thickness divided by the cosine of the angle of the plate from the vertical.
- If the hull value and the turret value are less than 20% apart, the game keeps the higher value.
- If they are not, the better protected area has a weight of 80% and the other area has a weight of 20%. In combat, this area was the most exposed.
- Skirts (Schürzen) and spaced armor give a moderate side bonus. This bonus protects against anti-tank rifles. It applies, for example, to the late Pz IV, the Pz III N, the StuG III G, the Brummbär, and the Hetzer.
- The armor that was missing on the Soviet T-44 mod.44 (a bug) is back.

Target profile

- The target profile (radius) is the size of the unit for the physics engine. It changes the chance of a hit, regardless of the size of the image.
- The game now calculates the target profile with the front and side faces. The front face has a weight of 2/3.

Rate of fire

- The rate of fire comes from the real combat rate, not from the maximum rate of the gun. It uses the space in the turret, the number of loaders, and the ready ammunition.
- Very heavy tanks (JS-2, Jagdtiger) have a small bonus. Their historical rate is 2 to 3 rounds each minute. Without the bonus, they cannot be used.
- Their rate is still much slower than in 4.21b. You can attack them from the flank during their long reload.

Hit points

- The same chassis has the same hit points, unless there is a specific reason. For example, a StuG III has the same hit points as a late Pz III.
- The large bonus of the heavy tanks is 5% to 10% lower. Their armor already protects them.
- Tank series: the models of a series are now more different. A "W" Sherman (wet ammunition storage) does not have the penalty of an early Sherman (dry storage, which explodes and burns easily).

Sherman	Hit points
Dry	550
Wet	650
Firefly	600
Jumbo	750

Variant	Forward speed	Reverse speed	Rotation speed
M4A1	0.85	0.57	no change
M4A2	0.95	0.64	no change
M4A3	1.05	0.70	no change
M4A3 HVSS	1.20	0.80	4 → 3
M4A4	0.95	0.64	no change

Immobilization thresholds

The threshold is the hit point level at which a vehicle is "in the yellow", loses a track, or cannot move.

Threshold	Vehicles
40%	Matilda II, B1 bis, Pz IV and StuG with full skirts
45%	Panther with half skirts, Churchill, Somua S35
50%	standard tracked vehicles
55%	early T-34/76 (very weak tracks)
60%	fully wheeled vehicles

Accuracy (dispersion)

- Previously, almost all tanks had the same accuracy. There are now 5 classes. A class groups many weapons to prevent a false level of precision.
- The accuracy is the dispersion of the complete weapon: gun, shell, trajectory, optics, mount, and ease of aiming.
- A lower dispersion is better.

Class	0 XP	1000 XP
Very accurate	58	34
Accurate	63	37
Normal	68	40
Fairly poor	73	43
Very poor	78	46

- The ratio between 0 XP and 1000 XP changes from 1.95 to 1.70. A crew with no experience fires less badly. Experience is still useful.
- Examples. Very accurate: Panther (75 mm KwK 42 L/70), Tiger II, Jagdpanther, German 88 mm anti-aircraft gun (FlaK). Accurate: Tiger I, Sherman 76, M10, Pershing, SU-100, 57 mm ZiS-2 gun. Normal: Pz IV G/H/J, StuG III F/G, PaK 40, Sherman 75, T-34/85, IS-2. Fairly poor: T-34/76, Soviet 45 mm guns, French 47 mm SA35 guns. Very poor: 75 mm KwK 37 L/24, 37 mm SA18 gun.

Large howitzers in direct fire

These units have a new category. The accuracy is 85 / 50 and the dead zone of the main gun is 100.

Unit	Accuracy before	Dead zone before
KV-2A	170 / 130	240
Brummbär	170 / 130	60
Churchill AVRE	178 / 120	120
Sherman M4A3 105	178 / 115	240
ISU-152	78 / 40	100 (no change)

- The SU-152 and the Semovente 105/25 stay artillery pieces. They keep their values.
- The range of these weapons also changes.

Fields of view

- The values at 0 XP and at 1000 XP are now the same. Previously, they were different by only 1 cell. The view thus changed suddenly between 499 and 501 XP.
- An open vehicle sees better than a closed tank in combat mode (crew inside). In march mode (crew outside), the view is the same.
- Reconnaissance vehicles have a view bonus.
- A new "reconnaissance tank" category exists: Pz II Luchs, Pz 38(t) reconnaissance, Stuart reconnaissance (GB and USA), amphibious T-40, and late BT-7 with 45 mm gun.

Unit	View inside	View outside	Total
Standard closed tank	14	+11	25
Reconnaissance tank	19	+8	27
Open combat vehicle	20	+5	25
Closed reconnaissance vehicle	20	+8	28
Open reconnaissance vehicle	24	+4	28
Reconnaissance vehicle with no exit	28	none	28

Other vehicle with no exit	25	none	25
Motorcycle and sidecar	28	none	28
Standard infantry, AT and AA guns	28	none	28
Sniper	29	none	29

Infantry anti-tank weapons

- The secondary anti-tank weapons did not work. They now work, and your soldiers use them. A new shot file exists: `SHOTS/grenade_at`.
- They equip the anti-tank riflemen, the corporals, and some elite soldiers (Marines, SAS, NKVD). Russian infantry has more options against medium tanks at short range.
- Corporals now have a submachine gun and the secondary anti-tank weapon of their nation.
- The impact damage of the Molotov cocktail is lower. The fire damage stays, because the game does not transfer it to the crew.

Weapon (nation)	Damage	Use
Hafthohlladung (Germany, Croatia)	147 mm, hollow charge	stuck on the tank
RBG-6 grenade (USSR)	100 mm, hollow charge	thrown, short
RBG-43 grenade (Yugoslavia)	70 mm, hollow charge	thrown, short
N82 Gammon Bomb (GB, USA)	very strong explosive, no penetration	thrown, short
N74 Sticky Bomb (France)	strong explosive, no penetration	thrown, medium
Breda Mod.42 (Italy)	explosive, no penetration	thrown, short
Type 3 grenade (Japan)	70 mm, hollow charge	thrown, medium

Anti-tank rifle	Penetration	Reload before	Reload now
Boys Mk.I (GB)	33 mm	6.4 s	6.0 s
SSG 36 (France)	33 mm	9.6 s	6.0 s
PzB 39 (Germany, Croatia)	33 mm	4.8 s	6.0 s
Solothurn S18-100 (Italy)	35 mm	9.6 s	7.0 s
Type 97 20 mm (Japan)	33 mm	3.8 s	5.0 s
PTRD-41 (USSR, Yugoslavia)	40 mm	4.8 s	7.0 s

- The dispersion of the anti-tank rifles changes from 70 / 20 to 75 / 43.

- Rocket launchers (Panzerschreck, bazooka, PIAT, LR4, Panzerfaust, Puppchen): the range, penetration, and reload time follow historical data.
- The Puppchen is again an ambush weapon. It is no longer a weapon for a duel in open terrain.
- The Panzerfaust 60 has a shorter range.
- The PIAT penetrates a little better than the bazooka, but its range is a little shorter.
- The Panzerschreck stays the best weapon.

Other data corrections

- The damage of the American 105 mm M3 howitzer is now the same as the other 105 mm and 107 mm howitzers.
- The Soviet tank destroyers SU-85, SU-85M, and SU-100 no longer have a heavy machine gun. They did not have one.
- Some Sherman tanks had too much .50 caliber ammunition. The number came from the old .30 caliber ammunition. It is corrected.
- Historical details: the Panzer IV J turns its turret more slowly than the Pz IV H and reloads more slowly. At the end of the war, rotation motors were not available.

Performance

- The cover, the "Get into cover" command, the crew mark, and the group panel use less processor time.
- The group panel counts only your units. It no longer counts your unit in a vehicle or a building of a different player.

Corrections

- **Crash after new units were added.** The game crashed when new units were added. The game can now load up to 16,384 files instead of 4,096.
- **Ambient sound stopped.** Weapon fire stopped the map ambient sound, such as wind and forest sounds. The ambient sound then started again from the beginning. The game can now play 64 sounds at the same time instead of 32.
- **Loss of synchronization in multiplayer.** Some fighters (P51, Corsair, Curtiss Warhawk) read an ammunition counter outside the aircraft. This value is different on each computer, and the game lost synchronization. Each weapon now uses its own counter.
- **Units blocked near a parked aircraft.** Units next to an aircraft parked at the airfield waited without moving. Previously, you had to give the Stop command to the aircraft. Units now move around the aircraft.
- **Airfield position.** If an aircraft receives a new command during its approach, it releases its reserved position at the airfield. It can reserve a position again when it returns.
- **Return of bombers and transport aircraft.** If you cancel the last route point, the aircraft keeps its automatic return command to the airfield. This applies to a bomber and to a paratrooper transport aircraft.
- **Aircraft buttons.** Aircraft buttons, such as observer, paratrooper, and bomber buttons, sometimes required two clicks. One click is now enough.

- **Aircraft sight at the left edge.** An observation aircraft near the left edge of the map shows its area of sight. Previously, up to 35 cells from that edge, it showed a part of the area or no area.
- **Garrisons visible on the M map.** An enemy garrison in a building was visible on the M map even when it was not detected. The garrison now appears only when it fires, enters the building, or exits the building. It disappears when the building is no longer visible. The minimap already used this rule.
- **Crew members never exited destroyed vehicles.** In the original game, no crew member exited a destroyed vehicle. See "Survivors from a destroyed vehicle."
- **Chat ping.** A chat message without a ping no longer sends an old map position. Previously, the recipients could see a circle and a ring at a random position.
- **Pointer marks.** The pointer no longer leaves marks on the battlefield to the right of the status strip.
- **Minimap arrow button.** The arrow button at the lower right of the minimap no longer leaves a gray backing or a broken minimap edge.
- **Black strip with `UIScale`.** With `UIScale`, the panel at the bottom left and the status strip no longer leave a black or noisy strip under them. Previously, this occurred at some screen sizes, for example 1360 × 768 pixels with `UIScale=1.25`.
- **Exploit corrections.** You can no longer:
  - fire at your own units to give them experience;
  - exit a tank and enter it again to fire more quickly.