Module 6. Engineering Operations

Rule 32: Overview of Combat Engineering

In game terms, combat engineers do four types of things: they create improved positions, create obstacles, breach enemy obstacles, and build bridges and ferries to cross water barriers. Improved positions consist of entrenchments, bunkers (entrenchments with overhead protection from artillery bursts and bombs), and vehicle hull-down positions. Obstacles consist of minefields, road craters, anti- tank ditches, and abatis. Because minefields are more complex than the other types, they are given their own rule.

A. When Engineers Work: Some engineer operations can (or must) be done before the game begins. Others are done during the game. All engineer work can be conducted within a game, though it will take a long time to complete some tasks. There are 12 game turns to the hour and some operations may take several hours. The length of time for the engineering operations are given below, just multiply the number of hours by 12 to get the number of game turns required.

1. Before the Game: All improved positions and all obstacles except minefields must be created before the game. Minefields may be laid before or during the game. Exception: point minefields may be laid only before the game.

2. During the Game: Minefields may be laid during the game. All breaches and water crossings are done during the game.

B. How Engineers Work:

1. Before the Game: the scenario will specify whether one player (or both) may do engineer work before the game, and how many hours of work may be done. The rules specify the work each unit may do in an hour. Improved positions and some obstacles are built with earthmoving points. Each earthmover unit counts as 6 points per hour. Some engineer companies receive extra earthmoving points representing additional equipment which has no use during the game, and is consequently not represented by counters. See the earthmoving assets table. Record completed work on the engineer log. (*The log can also be used to keep track of engineer work during the game that is normally conducted prior to the game. That way the engineer unit can perform all tasks described).*

2. During the Game: Engineer work is counted in friendly movement phases. Units must be in march formation in the hex in which the work is performed. Units do no work if suppressed, shaken , or broken. Units which do engineer work may not fire in the following combat phase. (The player may have units stop working if he wants them to fire.)

When work begins it is recorded in the engineer log. It has no effect until completed. If a unit stops working, its progress is retained, and work may be resumed later.

3. The Engineer Log: The log is a complete record of engineer work. Each operation gets one line, marked as follows:

Done: Check this column when the work is complete
Location: Put the hex or hexside number of the operation here. Hexes need map letter and hex number , for example, E1809-45 means hex-sides 4 and 5 of hex 1809, map E. Hexside 1 is north (or just clockwise of North); number clockwise from there. *(If using multiple copies of the same map add a second letter; for example using the above example, there are two E maps being used. One map would be EA and the second would be EB. So if the work was being done on the first E map it would be written EA1809-45.)*
Operation: Record the work being done
Time: Write the number of phases needed for the work to be done; each phase that work is done, put a mark after this number until the work is completed.

4. Markers: There are markers for each engineer operation. When the position is spotted, put a marker on the map. For all except minefields, the position is spotted if an enemy unit has LOS to it at the end of movement or comes adjacent to it during movement. Hull down positions, entrenchments, and bunkers are built for protection and concealment. These positions or units in them must be spotted using the spotting rules for units under cover unless the spotting unit moves adjacent to it, then it is spotted. ***For minefield spotting see Rule 34.***

Rule 33: Engineer Units

A. Definitions: three terms used in the rules need definitions.

1. AVLB (Armored Vehicle Launched Bridge): the WP MTU-55 and MTU-72; and the NATO BIBER, M-60 AVLB, M-104 Wolverine, Challenger AVLB, and AMX-30 AVLB.

2. Earthmover: Units with a diamond ◆ in the upper right of the counter are earthmovers. These are the WP IMR, and BAT-M; the NATO M-728, M-9, PiPz, PR, AMX-30 AEV, Fv180, Centurion AVRE, and Chieftain AVRE 2. Units with an inverted triangle ▼ in the upper right of the counter are dozer blades or vehicles that have been converted into earthmovers by the addition of a dozer blade; i.e. French VAB Engineering vehicle.

a. Dozer blades: These are earthmoving blades that may be assigned to any tracked vehicle unit or any wheeled vehicle unit with 6 or more wheels; i.e. jeeps, Humvees, Land Rovers, etc. are 4 wheeled vehicles. These blades have an inverted triangle ▼ and may perform earthmoving tasks at 3 earthmoving points per hour and allow the assigned vehicle to function as an earthmover. Armor and Mechanized Battalions have 3 organic dozer blades and

Engineer battalions have 4 organic dozer blades that may be cross attached to any unit.

b. Earthmovers **:** These are specialized engineering vehicles designed to move significant amounts of earth and debris. These units have a diamond and may perform earthmoving tasks at 6 earthmoving points per hour.

3. Heavy Vehicle: Any armored vehicle with a frontal armor of 11 or more is a heavy vehicle.

B. Single Vehicles: AVLB and minefield breaching units each represent a single vehicle, indicated by a white vehicle silhouette. In direct fire (anti-tank and conventional), one shot expended by a firing unit allows for two die rolls against the single vehicle (or unit) in one hex. When determining the number of steps in a hex (for fire purposes) or in a company (for morale purposes) a single vehicle counts as only half a step; round fractions up.

Rule 34: Minefields

There are three types of minefields (and minefield markers): hex, hexside, and POINT. If three hexside minefields of the same characteristics (see below) are laid in the same hex, remove them and replace them with a hex minefield. Point minefields are covered in F below; the rest of this rule concerns hex and hexside minefields.

A. Characteristics: Minefields have three characteristics in addition to hex/hexside.

1. Density: A minefield is either single or double (D) density.

2. Composition: A minefield is either anti-tank (AT), anti-personnel (AP), or mixed (MX).

3. Camouflage: A minefield is either camouflaged or un-camouflaged. Most minefields are un- camouflaged

4. Recording Characteristics: When a minefield is laid, write its characteristics in the engineer log. Single density, un-camouflaged minefields are assumed unless specified otherwise. For short, a double density, mixed camouflaged minefield would be written as DMXC. A single density, mixed un-camouflaged minefield would be just MX.

B. Detection: There are two ways to detect a minefield: spotting it and running in to it.

1. Spotting: A camouflaged minefield may be spotted only by dismounted personnel units or Engineering Reconnaissance units. The minefield is spotted immediately when the unit moves adjacent. (In case of a hexside minefield, adjacent means in any hex which one of the minefield hex-sides is part of.) An un-camouflaged minefield may be spotted by any unit. The unit attempts to spot as it enters the minefield (moves into the hex or crosses the hexside); if the spotting roll is successful, the unit stops short of the minefield and may move no further in the phase, but takes no casualties. See the ***Minefield Spotting Table.***

2. Failure to Spot: If a unit fails to spot a minefield, it runs into the minefield; roll for losses (see below). Whether or not it takes losses, the unit stops short of the minefield and may move no further in the phase.

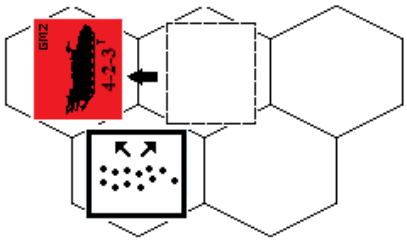
3. Results: Whichever of the two means above cause a minefield to be detected; its marker is immediately placed on the board. No unit may enter or cross a minefield during the phase in which it is detected.

4. Laying in Sight: If a minefield is laid in a hex which is visible to the enemy at the time, it is immediately spotted and the marker is placed on the map.

C. Effects: AP minefields attack only dismounted leg mobile or static units; AT minefields attack only vehicle units; mixed minefields attack all units. A minefield attacks separately each step which enters its hex or crosses its hexside. A hex minefield counts as three successive hexside minefields. (Exception: a unit which detects a minefield by running into it is only attacked once, and only one step of the unit is attacked.) For each step cross the minefield, roll a die and consult the mine attack table. (Thus there are two rolls for a full-strength platoon.) The step is eliminated if the number rolled is equal to the number on the table. Note: Minefields have no friends. Any unit of either side which tries to cross the minefield is attacked.

D. Minelaying: Minefields are most commonly laid by specialized vehicles or by artillery fire. In the descriptions below, all minefields are un-camouflaged unless otherwise stated.

1. Vehicles: Minelaying vehicles create hexside minefields; they create hex minefields by laying three minefields in the same hex. A minelaying vehicle creates a minefield either on two hex-sides of the hex it occupies or, when moving from one hex to another (in march formation), on adjacent hexside of the two hexes. See the diagram below:



Specific characteristics of the various minelayers are given on the minelayer table.

Load: is the number of phases in which an engineer platoon can load the system with mines. (Exception: a GMZ does not require an engineer platoon to load.)

Fields: is the number of single-density minefields produced; a double density minefield counts as two of these.

Type: gives the minefield's characteristics.

Rate: gives the number of minefields laid per phase; ½ means that it takes two phases to lay one minefield. Rates are for single or double density, except for the Mi-8, which takes 4 phases to lay a single density minefield or 8 phases for a double density minefield.

a. GMZ and MiV: These systems are capable of laying mixed, camouflaged minefields at half their usual rates. The MiV must be accompanied by an engineer platoon to do this. *The Czech MU90 is the Czechoslovakian version of the GMZ and has the same characteristics.* **See the Minelayer table.**

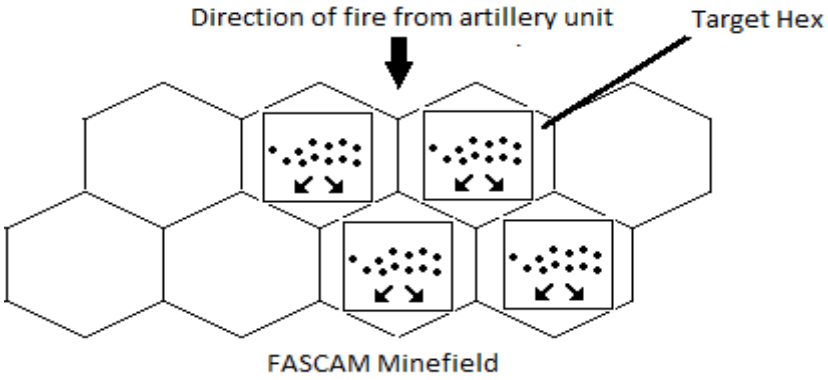
b. UH-1H and UH-60: Only specially equipped helicopters, found in armored cavalry regiments, can lay the M-56 anti-tank mine. No loading is necessary; it enters the board loaded and cannot be reloaded. *(A helicopter can be resupplied at the regimental Log Base if using the optional Logistic Rule 22. It would take 6 Logistic Phases to reload one helicopter and only one may be loaded per Log Base.)* The 6 single density fields must be laid in two groups of 3; the double density minefields must be laid as one group. The minefields in each group must form a continuous, non-overlapping line (i.e. hexside minefields in one straight line). The minefields are laid as fast at the helicopter can move.

c. Mi-8: Mi-8 helicopters can lay mines. The helicopters enter loaded and can lay single density minefields at the rate of one in four phases or double density minefields at the rate on one in eight phases (counting the airmobile phase.)

d. Other NATO Minelayers*:* NATO minelayers such as the U.S. M128, may lay mines during the game in the same fashion as the GMZ and MiV. Only the MiV requires an engineer platoon to be present. See the minelayer table.

2. Artillery: Minelaying by artillery fire produces a pattern of several adjacent, hex minefields. The size varies, as given below. The fire mission order must list each affected hex and the minefield characteristics.

a. FASCAM (NATO): These mines are fired by M-109, AS-90 and GCT 155mm howitzer units. There are two types of rounds: AT and AP. In a single fire mission, AT may be fired at a single hex or a pattern of four hexes (see diagram); AP is always fired as a four hex pattern. The number of steps required for a fire mission of each type is given on the FASCAM table. Note that although some fire missions require only one step, it is not possible to assign a fire mission to less than a platoon (two steps at full strength), in this case, the platoon may fire two adjacent patterns, or the player may choose not to fire the extra step. (In reality, both steps fire the mission in half a turn.) AT and AP fire may be combined in one mission to produce a mixed minefield. A single density minefield may be added to an existing minefield to produce a double density minefield. An AP minefield may be added to an existing AT minefield (but not the other way around) to produce a mixed minefield.



b. WP Artillery-Emplaced Mines: Very little is known about WP artillery emplaced mines except that they exist and are fired by the multiple rocket launchers (There was a round for the BM-21 as well. It fired AP or AT rounds Allow for the BM-21 to fire either an AT or AP minefield using the same characteristic). One step in one fire mission produces one hex double density AT minefield or two adjacent single density AT minefields. *A full strength platoon of BM-27s produces two double density adjacent pattern or four single density adjacent four hex patterns (as shown above).*

3. Minelaying before the Game: The pre-game minelaying table gives minefields laid per hour for each minelaying vehicle counter, for single/double density minefields. Each scenario also gives limits; the total number of single density minefields available to the player (supply limits).

E. Minefield Breaching: there are two main ways used to breach minefields quickly; mine plows/rollers and rocket fired explosive line charges. Minefield breaching requires equipment only; engineer assistance is not necessary.

1. Plows/Rollers: Each NATO and WP tank battalion has a set of mine plows, rollers, or combination units (all of which are treated the same in these rules and are hereafter referred to simply as "rollers"). At the beginning of the game each battalion's rollers must be assigned to a tank platoon and recorded on the equipment roster. They may not be transferred later. A tank platoon with rollers attached has its movement allowance reduced by one.

To breach all minefields on a single hexside or to breach a hex minefield, the roller platoon must pay one additional movement point in addition to costs to enter the new hex. For each minefield breached by rollers, roll a die on the mine attack table to determine if the roller is destroyed. (Roll three times for a hex minefield.) The minefield is breached even if the roller is destroyed.

West German rollers are never destroyed (actually these are chain flails). The platoon can breach as many minefields in a phase as its movement allowance allows. *(As a player aid MICLIC counters are available in the Neutral Marker section).* The Finnish RA140 is a dedicated roller vehicle.

2. Line Charges: Long tubes filled with explosives are fired by rocket over the minefield, and then detonated to create a breach. Line charges are fired during the movement phase.

a. MICLIC (NATO): This line charge is towed behind a tank (or dedicated AFVs such as the U.S. M-58 or UK Giant Viper); one step can tow two charges, assigned as equipment before the game. (The M-58 and Giant Viper carry 3 charges). Each engineer company has three charges available. These charges may be cross-attached to tank or armored personnel carrier (tracked). If attached separately, place a MICLIC counter underneath the armored vehicle unit. If a full strength platoon takes a hit it loses half of its line charges (fractions rounded up).

The line charge breaches one hexside minefield (or 1/3 of a hex minefield). The towing vehicle must begin the movement phase adjacent to the minefield and may not move. Only one line charge may be fired across a single hexside in one movement phase. (As a player aid MICLIC counters are available in the Neutral Marker section for use with non-dedicated vehicles, i.e. M-1 tank.)

b. M-1979 (WP): The M-1979 is a dedicated line charge vehicle. It can breach all minefields on a single hexside (or one hex minefield) in a single movement phase. The M-1979 carries enough charges for four hexside minefields. The M-1979 must begin the movement phase adjacent to the minefield and may not move except that it must enter the hex if breaching a hex minefield. The Czech SVO is the Czechoslovakian version of the M-1979 and has the same characteristics.

3. Visibility: Both rollers and MICLIC are easily visible to the enemy; when a unit is spotted the owning player must state if it is so equipped.

4. Effects of Breaching: When a minefield is breached, place a breach marker on it. If the hex or hexside still has un-breached minefields, place a partial breach marker instead. For example, if a player's rollers are destroyed on the second die roll against a hex minefield, the minefield is only 2/3 breached. The players will have to remember the exact extent of a partial breach (easily done by making o notation on the Engineering Log). For hex minefields, the breach must leave the minefield hex on a specific hexside, which can be any of the three hex-sides not adjacent to the entry hexside. Orient the breach marker to indicate the exit hexside. No unit except the breaching unit may move through the breach in the movement phase in which the breach is made. In subsequent phases, units pay one movement to enter the breach in addition to other terrain costs.

F. Point Minefields: Point minefields are laid before the game. An engineer platoon can emplace three point minefields per hour. All point minefields are single density, mixed, and camouflaged.

1. Location: Point minefields are laid at a single point within a hex. There are three possible locations attached to a road crater or abatis, on a road, or at a river crossing.

a. Attached: Units attempting to breach or cross the crater or abatis encounter the minefield.

b. Road: The minefield is placed on a road hexside. Only units using the road (moving along it in march formation) encounter the minefield.

c. River-Crossing: A river-crossing is the point at which a road crosses a river or stream. The minefield is on one side only (which must be specified). Units attempting to use that location as a bridge or ferry site encounter the minefield.

2. Breaching: A point minefield may be cleared (removed) in 12 phases by an engineer platoon. More than one platoon may work at once; mark the log twice each phase if two platoons participate and so on. This is the only method which works on abatis. Roads and river crossings can also be breached by roller.

Craters can be breached by roller, then crossed by AVLB, and then breached again by roller; the road is not clear until the second breach. (*Line charges do not breach point minefields*). *The Finnish RA140 functions as a roller.*

G. Minefields Combined with Obstacles: if a hex or hexside minefield overlaps abatis or anti-tank ditch, the minefield must be breached twice: once before and once after breaching the obstacle. This procedure is necessary for road craters only if the player wants to clear the road.

Rule 35: River Crossing

A. River and Bank Types

1. Rivers: In previous games of the series, it was assumed that there was a bridge wherever a road crosses a stream; when the engineering rules are used, this is no longer true, and a non- amphibious wheeled vehicle may not cross a stream unless a bridge has been built there. Bundeshwehr introduces three types of river (in addition to streams) as shown on the terrain key. None of them may be crossed except by amphibious vehicles. Streams and deep streams are 20meters wide. Narrow (hexside rivers are from 20 to 150 meters wide; wide (hex rivers are greater than 150 meters wide; a river's exact width is given in the scenario description.

2. Fords: Deep streams and narrow rives may have fords. A ford hexside has the same characteristics (except for width) as a stream.

3. Banks: A river's banks restrict crossing operations. There are three possible bank conditions, shown on the terrain key, which may differ between the two sides of a river. If no banks are shown, conditions are excellent; there are no restrictions. If either bank is impassable, the river may not be crossed there. If the bank is intermediate, there are no restrictions on swimming vehicles and PTS-M ferries, but the bank must be improved before a bridge or ferry (other than PTSM) can operate.

4. Bank Improvement: An intermediate bank must be improved before a bridge or ferry can be established there. The entry bank must be improved before the work can begin on assembling the bridge or ferry; the far bank must be improved before the bridge or ferry can begin operation. Bank improvement takes an engineer platoon, or earthmover 12 phases. If two units work at the same time, mark off two phases on the log, and so on.

B. Bridges: When work begins on a bridge, place a bridge site marker in the hex. Record the type of bridge and number of steps needed to cross the river on the engineer log under operation. When work is finished, flip the marker over to a bridge. Units may begin crossing the bridge on the phase after work is completed.

Bridges may be attacked by conventional or indirect fire, (and bombs if using the Close Air Support rules) and are counted as weapons. Suppression has no effect. If one or more steps are eliminated, they must be replaced (at the same rate as the bridge is built) before the bridge may resume operation.

1. AVLB: An AVLB may be emplaced across a stream or deep stream in 1 phase. The vehicle must begin the phase adjacent to the stream. Up to three BIBERs may be connected to bridge small rivers. The first BIBER takes one phase, the second and third BIBER take two phases each. Total length is 33 meters for two and 45 meters for three.

2. TMM and EFA: One step of TMM bridging crosses a stream or deep stream. Steps can be combined to any length to cross rivers. It takes 4 phases to lay one step, at 20 meters per step. When a TMM unit's steps have been laid, remove the counter (leave counter in place and place a bridge marker on top of it. One step of EFA bridging crosses a stream or deep stream. Steps can be combined to cross rivers. It takes 1 phases to lay on step, at 25 meters per step. When the unit's steps have been laid to the desired length place a Bridge marker on top of the EFA.

3. Ribbon Bridges: Ribbon bridges can be used only on rivers. The number of steps needed to cross a river of a given width (or less) is shown on the Ribbon Bridge Table. (The formula is steps = meters/13.5, round up). Ribbon bridges are laid at a rate of 2 steps per phase. When both of a ribbon unit's steps have been laid, remove the counter. There are two types of ribbon steps: ramp and center. Each WP company has 1 ramp step and 9 center steps. Each NATO company has 4 ramp steps and 10 center steps. Each bridge must include only 1 ramp step. Thus, for example, a Soviet company could build only one bridge, and the longest bridge a U. S. company can build is 148 meters (11 steps). It is not necessary to keep track of a step's type until it is incorporated into a bridge; the only effect is to place limits on the number of bridges built. The French PFM and U.S. M1977 CBT function as a ribbon bridges.

4. Removal: It takes twice as long to remove a bridge as to emplace it. The bridge no longer functions when removal begins. When a bridge unit's steps have been removed, put the counter back on the board.

C. Ferries: when work begins on a ferry, place ferry site marker in the hex. Ferry operations are kept track of on the ferry log. Write the ferry site's location in Location. Record the number of ferries of each type (Ribbon, GSP, PTS-M and M-2 (UK) and EFA (FR)) under Ferries. Each operating ferry generates ferry points each phase; the number depends on the width of the river, as shown on the ferry table. To determine the total points in a site, multiply the number of ferries by the points per ferry. Count PTS-M ferries separately. Enter the total (or the two totals if there are PTS-M ferries) on the log under Points/Phase. It takes 40-points to carry across one step of heavy vehicles (frontal armor of 11 or more) and 20-points for one step of other units. The French EFA may not ferry heavy vehicles. Units being transported (infantry in APCs for example) cross free. When a unit begins crossing, put it under the ferry site marker until enough ferry points have accumulated for it to cross. Each phase, record the ferry points accumulated on the ferry log under Points Across. When a unit has crossed, mark off those points and start with another unit. Ferries may be attacked by

conventional, indirect, (and bombs if using the CAS rules) and are counted as weapons. If a ferry is suppressed, shaken or broken, it does not operate.

1. Ribbon Ferries: These take 4 phases to assemble. Two ribbon steps make one ferry; when a ferry is finished, remove the counter. One additional ramp step is also needed at each WP ferry site. If a ferry step is destroyed, one ferry is out of commission; it may be restored by adding another ribbon step, in 4 phases.

2. GSP, M3 (UK) and PFM (FR): These take 1 phase to assemble. One step makes one ferry; when a ferry is assembled, remove the counter. The French PFM takes 2 phases to assemble.

3. PTS-M: These take no time to assemble and may begin operating if they start the phase adjacent to a river. One step makes one ferry. When a ferry begins operation, remove the counter. The PTS-M ferry may not carry armored vehicles.

4. Removal: It takes twice as long to remove a ferry as to emplace it. The ferry no longer functions when removal begins. When a ferry's steps have been removed, put the counter back on board.

F. Swimming: Amphibious vehicles can cross streams and rivers at the rates given on the swim table. If crossing takes one phase, the unit starts the phase adjacent to the river and ends the phase adjacent to the river, on the other side. If crossing takes two phases, the unit starts adjacent to the river, moves one hex onto the river in the first phase, and moves one hex off the river in the second phase.

Fast amphibious vehicles are the BRDM, BMD, BTR, SA-9, Fuchs and Luchs. (*Contrary to the original Assault, M-2/M-3 Bradley Fighting Vehicles were not very amphibious. It did originally, in the M-2/M-3 and M2A1/M3A1 vehicles include a flotation screen, but these were ponderous and time consuming to erect and did not function safely. Optionally, treat all Bradleys as a non-amphibious unit*).

G. Snorkeling: WP tanks (T62, T-64, T-72, PT-91, M-84, T-80 and T-90) may cross rivers by snorkeling at a snorkel site. They must be first prepared; this takes 6 movement phases without moving or firing. A prepared tank may not fire anti-tank fire until the turret ring is cleared, which takes 2 phases without moving or firing. A prepared tank may fire conventionally (SCAP/SCHE or SA), but if it does so it may no longer snorkel. A tank crosses the river in 1 phase per 100 meters (or fraction) of river width.

Possible snorkeling sites are very limited. Before the game, for each map, randomly determine 3 sites (hexes or hex-sides) per river, chosen from among possible swim sites (i.e. passable banks). Both players know the locations.

H. Bridge/Ferry Load Limits: See the Bridge/Ferry Classification Chart in Charts & Tables section for Bridge and Ferry vehicle weight limitations. These limitations may restrict certain heavy armored vehicles from using the specific type ferry or bridge.

Rule 36: Obstacles

Obstacles are normally built during pre-game set up but may also be constructed during the game. This can also be done during the game at a rate of 12 turns per hour. Just keep track of the work on the Engineer Log. The obstacle is not complete until the total time required to build it is completed. Work is listed per platoon or engineering vehicle. Up to two platoons or vehicles may combine to complete the work in the same hex in half the time.

A. Road Craters: A U.S. engineer platoon makes 3 per hour; other engineer platoons make 2 per hour. A road crater blocks the road across one hexside. A crater can be breached by an earthmover in 6 phases of an engineer platoon in 12 phases, or it can be crossed by an AVLB.

B. Abatis: An engineer platoon or earthmover makes 1.5 abatis hex-sides per hour (3 in 2 hours). Abatis creates a dense woods hexside and blocks any road on that hexside. Abatis can be breached by an M-728, AVRE, or CEV in 6 phases, any other earthmover in 8 phases, an engineer platoon in 10 phases, a platoon plus earthmover in 6 phases, or a platoon plus M-728, AVRE or CEV, in 4 phases. The M-728, AVRE, and CEV expend one round of HEP ammunition in breaching the abatis.

C. Anti-tank Ditches: Two hex-sides (one marker) of AT ditch costs 20 earth moving points; vehicles may not cross AT ditch hex-sides. An AT ditch can be breached by a M-728, AVRE, or CEV in 6 phases, any earthmover in 8 phases, an engineer platoon in 10 phases, a platoon plus earthmover in 6 phases, or a platoon plus M-728, AVRE or CEV, in 4 phases. The M-728, AVRE, and CEV expend one round of HEP ammunition in breaching the AT Ditch. Alternatively, the ditch can be crossed with an AVLB.

D. Wire: *Engineer P-class* units may emplace 2 hex-sides of wire obstacles per hour up to a total of 6 wire obstacle hex-sides. *Infantry A P-class* units may emplace 2 hex-sides of wire obstacles per hour up to a total of 2 wire obstacle hex-sides. Wire obstacles may be breached by any *Infantry P-class* units by spending 1 complete game turn (un-suppressed) adjacent to the hex-side to be breached. The unit may conduct direct fire but may not move. *Engineer P-class* units may breach wire obstacles by completing 1 complete movement Phase (1^{st} or 2^{nd}) adjacent to the hex-side to be breached. Earth-moving vehicles or vehicles equipped with a Mine Plow or Dozer blade may breach a wire obstacle hex-side by expending +1 movement point when crossing the hex-side in Combat Formation. Wire obstacles may be combined with other obstacles and minefields. Each obstacle and minefield would have to be breached.

Rule 37: Improved Positions

All improved positions must be built before the game.

A. Entrenchments: One entrenchment costs 3 earthmoving points. in addition, all dismounted personnel begin the game in entrenchments if they have been in position for at least 2 hours before the game begins. The effects of entrenchments are given in Rule 17.

B. Hull Down Positions: one hull down position costs 6 earthmoving points. in addition, all WP tanks and self-propelled artillery begin the game in hull down positions if they have been in position for at least 2 hours before the game begins.

A hull down position holds 2 steps of vehicle units (or 4 steps of P class, or 2 steps of W Class). A hull down position is entered in the same manner as an entrenchment. A hull down position counts as cover; however, there are four covered hex-sides, not two.

Vehicles in hull down positions have increased indirect fire defense value against HE (but not ICM) and conventional fire. V class units have a strength of 20 and AFVS have a strength of 40.

Anti-armor fire is multiplied by 1/3 for NATO and Non-aligned Western-produced AFV and AIFV (Sweden and Austrian); anti-armor fire base hit chance is multiplied by ½ for Warsaw Pact (including Finnish produced Soviet vehicles) and Jugoslavian AFV and AIFV. *(Any vehicle will derive protection from a hull down position. Though intended for AFVs, W-class units have an increased defensive fire value of 15 versus HE indirect fire only.)*

C. Turret Down Positions: One Turret Down position costs 10 earthmoving points. A Turret Down position holds 2 steps of vehicle units. A Turret Down position is entered in the same manner as an entrenchment. A Turret Down position counts as cover; however, all hex-sides are covered.

Vehicle units in Turret Down positions may only be attacked by direct fire by adjacent enemy units or after they have conducted direct fire/opportunity fire and spotted by any enemy unit. Vehicle units in Turret Down positions have their spotting range reduced by 4 hexes when attempting to spot unidentified or un-spotted enemy units. Enemy units attempting to spot units in Turret Down positions add +3 to the spotting die roll in addition to all other modifiers.

A vehicle unit in a Turret Down position may only exit to the hex to the rear. Turret Down positions are placed in a "combat formation" and units must be in combat formation to occupy a Turret Down position. Direct fire versus a vehicle in Turret Down position incurs a +1 die roll modifier to the *"To Hit"* die roll in addition to other die roll modifiers; UNLESS the attacking ammunition is a *TOP DOWN* attack weapon.

Vehicles in Turret Down positions (similar to Hull Down Positions) have increased indirect fire defense value against HE (but not ICM) and conventional fire. V class units have a strength of 20 and AFVS have a strength of 40.

D. Bunkers: A bunker costs 6 earth moving points plus 3 hours of work form an engineer platoon. In addition, dismounted personnel units may begin the game in bunkers if they have been in position for at least 8 hours before the game begins. Bunkers are identical to entrenchments except that their indirect fire defense strengths are 30, not 20.

E. Fortifications: Some countries; Austria, Italy and Norway for example, make extensive use of fixed fortifications in their defensive networks. These fortifications are usually found around strategic installations, mountain passes and vital terrain features.

1. Tank Turret Emplacements: Some armies employ tank turrets in fortified positions; i.e. Austrian Centurion turrets. These units are treated as if they are in hull down position with 360˚ coverage. These style fortifications have a defense modifier to the base hit chance die roll multiplied by 1/3 versus anti- armor fire and a conventional fire defensive value of 40.

2. Static Formations: Static formations include infantry, artillery, anti-tank and air defense P and W class units that are assigned to fortifications; i.e. Austrian SpK infantry units. Artillery and Air Defense units have an F class mobility identifier and may not move. Static Formations begin all scenarios in bunkers.