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Designer's Notes

1

James F Dunnigan

As is our custom, we start off this column (written 7/12/71) with a rundown of the latest game developments from this end of the operation. TSG's presently in the works include WAR IN THE EAST, which is in the final stages of playtesting. Because of the size (a four section 44x56 inch board, 1500+ counters) and scope of the game (the entire war in the east, from the arctic to the caucasus, from 1941 to '45) it still looks like this item won't be finished until the end of the year. It may be announced ready for sale in issue 29 of S&T. Maybe. Recently completed and being prepared for publication are PHALANX (Tactical Game 18, Greece/Asia Minor/Rome 500-100BC) and DARK AGES (Europe/Asia Minor 700-1300AD). Both of these games use basically the same system as the earlier Tac 14 and Tac 13 games, only the mechanics have been improved considerably. So if you want to see what went on during these periods, these games are the easiest way to find out. And, no doubt, there are those of you who would like to put some viking axemen and swordsmen (from Tac 16/Dark Ages) up against a Greek phalanx (from Tac 18). Different strokes for different folks. Also nearing completion are the second editions for LEIPZIG and BARBAROSSA. These games will differ, mainly because of improved mechanics and situations, from the original editions considerably. Components will be of the same quality as those found in the second edition of KOREA (already available). A revision of DEPLOYMENT (Tac 10) resulted in an entirely new game to be called GRENADIER. The major revision was a change in the scale, scope and set-ups from those used in DEPLOYMENT. GRENADIER uses company size units (100-140 men) as opposed to battalion size (400-600 men) in DEPLOYMENT, a scale of 50 meters to a hex as opposed to 100 meters, scenarios re-creating specific portions of actual battles (like meeting engagements and flank attacks, etc) instead of generalized tactical situations. Now what happens to DEPLOYMENT? For the moment it remains in print, although it appears that an eventual replacement for DEPLOYMENT will be in the form of a brigade level game in which entire battles of the period can be re-created. Finally into the homestreach is SARATOGA, which had the misfortune to come into our hands right after we started STRATEGY I. This will be our first game on the American Revolution. Another will follow in issue 33 of S&T covering the entire revolution on a strategic level. We also have a Tac series game (Tac 17) on the revolutionary period in the works. We recently got the USN: WAR IN THE PACIFIC game to the playtest stage, a little behind schedule as this one goes into S&T 29. We have a number of other games under consideration, but the latest one assured of publication is BATTLE OF STALINGRAD. This game uses the same approach as KURSK (same scale, basically the same movement mechanics, etc).

It will cover, primarily, the Russian offensive which cut off the German sixth army as well as the initial German attempts to rescue their surrounded troops. If we can manage it we will also attempt to portray some of the other situations which took place in that area. If we're lucky, we'll have some eight new (or revised) games out before the end of the year.

Our main feature this time around is, "How the game 1940: THE BATTLE FOR FRANCE just grew and all of a sudden it was there". A number of games which we have and will produce this year were

initiated as a result of the Feedback in S&T 23. The events were rated in the following order; 1=Battle for France, 1940; 2=The Pacific 1941-45; 3=Napoleonic Wars; 4=Battle for France, 1944; etc. Anyway, you can see what we mean. We got the message. So on 6 January 1971 it was decided to design a game on the Battle for France in 1940. I remember the date because I wrote it down, along with the dates of some of the more significant events which transpired as the design proceeded. You will note that often the design proceeds in fits and starts. Often there are more fits than starts. Judge for yourself.

By the 20th of January the Order of Battle was fully developed. On the 22nd the prototype mapboard was finished (after the significant terrain features had been determined). On that same day the first (of four) Combat Results Table was developed. Now that is quite a lot to accomplish in two week's time. If you've started from nothing. But we hadn't. Having already turned out nearly thirty games, much of the needed information had already been worked up for other games on similar periods. For example, in doing work on any game concerning the Germans in WW II we were forced to reconstruct the German OB for the entire war. Much the same happened with the British. The only real problem was the French, who did not appear much after 1940. The terrain analysis for the mapboard was taken from the research done for 1914, with adjustments made for the wider use of motorization in 1940. The CRT, we decided, would be the keystone upon which the game would be resolved in a realistic fashion. This mainly because we quickly saw that one of the main problems with recreating the 1940 campaign lay in the rather odd manner in which combat was resolved between the Allies and Germans. It was odd because the Germans had a tactical advantage which was not all that apparent at the divisional level (of the game). It was primarily their armored and motorized units which had the advantage. The advantage being, primarily, the ability to move much more quickly than the Allied non-motorized and motorized units (although the advantage over the latter was marginal). A further advantage of their motorized force was the concentrated power of its weapons compared to Allied armored units (even though the Allies had, over all, more tanks). But the most decisive German advantage that had to be built into the game was the use of air power. This was what gave the Germans the ability to concentrate overwhelming power at the decisive point. It was absolutely necessary, it became immediately apparent, to reflect the use of air-power. So now for a digression on how the airpower rules for 1940 were developed. I first had to face the use of airpower while developing the air rules for the BLITZKRIEG MODULE SYSTEM (S&T 19). Previous to this my attitude was (and still is, to a certain extent) that air power was a form of strategic artillery whose main function was to interdict enemy supply lines and, tactically, force the enemy to travel at night by attacking whatever enemy forces that traveled by day. This was probably most true during 1944 in France. At other times, in other places, it was much less true. As I quickly found out. In the BMS I was forced to work with air units because of the "three dimensional" aspect we felt the game had to have. Digging into the mechanics of it all it became apparent that the ground support element of air units was as important (if not more so) as the aircraft themselves. We were also able to define the actual "missions" which aircraft could perform, as well as their effect. All we had to do for 1940 was introduce a moveable base unit and narrow down and simplify (or "rationalize") the missions the aircraft units could perform. This system was

also used in KURSK (which was designed after 1940). Most of the other elements of the design (supply, movement, length of game) were handled routinely. Again, this was possible because of our experience. If you want to know where experience comes in handy, that's where. Previous Designer's Notes columns have covered these "bread and butter" aspects of design. Here we will continue to cover those elements that were unique to the game 1940 and critical for its design. After we first playtested the game on 22 January we, of course, ran into problems. As anyone could predict, the Allies got creamed. The question was, what sort of "What If's?" could be built into the game to give the Allies a chance in a different scenario. Moreover, were the Allies getting the short end of it in the game for the same reasons as in the original situation? It appeared not and the first thing to be changed was the CRT.

This was done on 27 January and on 1 February we we tried the game again with yet a third CRT, and a new set of unit counters with new movement and combat factors. By 5 February we had our first written draft of the rules. On the 8th we developed the optional games (OB's) and gave the Allies air units also (before this it was thought that, because of the German air superiority, all we had to do was give one side air units in proportion to their superiority). On the 9th a third set of counters was developed, which included German heavy artillery and paratroop units. On the 11th (we were getting hot now) the paratroop rules were finished while, for the first time, Allied mobile units were given a second impulse (as the German units had all along, it finally dawned on us that the Allied mobile units weren't all that bad, they were just poorly used). On the 12th of February the victory conditions assumed their final form. Development from this point on consisted of an inordinate amount of testing. One final revision of the CRT was made in early March. The intensive testing program needed for 1940 was a result of, well.... It seems that 1940 turned out to be one of those "house of cards" type designs. In order to get the original flavor of the campaign into an enjoyable, realistic and playable game it was necessary to balance an unusual number of volatile design elements. The final CRT was a rather bloodless one, which can

often lead to a stalemated game (such as in 1914). The same applies for the OB's. In 1940 the Germans don't have that much of an advantage. What numerical advantages they do have are compromised by the brevity of the game. Yet, the Germans still have the advantage. In order to use it they must use their motorized units very skillfully. If they don't they will surely lose most of the time. If the Germans do use their motorized and air units correctly (that is, in mass at a decisive point) they will almost always win using the historical scenarios. 1940 is a game in which with two fair or poor (but equal) players the Allies will usually win. But with two good (but equal) players the Germans will usually win. The game has inherent in it numerous "tricks" which become known only after considerable playing. This, we felt, offset the need for "good" players to get the most out of the game. 1940 should turn out to have considerable staying power as people must continually play it as new wrinkles constantly appear. What this short discussion on the development of 1940 should convey is the necessity for persistence in designing a game, as well as adherence to the "principles" of realism, playability and interesting game mechanics and situations. At one time I felt that a game on the 1940 campaign could not be done. I was wrong, as is anyone who refuses to give it a try anyway, and then keep on trying. ● ● ●

Bulge

Omar DeWitt

Avalon Hill's BATTLE OF THE BULGE was quite an innovation when it first came out; mainly because of the changed combat results table. The "Engaged" and "Contact" results lowered the attrition rate on individual battles and made it a different game. Longer advances and retreats also made the game different.

I anticipated many questions on situations involving several stacks of attackers and defenders with some ending up Engaged and others not. However, very few of these questions did materialize; players seem to have figured out any problems for themselves.

Several questions concerning forts did arise. A very common one can be answered simply: when a unit in a fort is attacked, or attacks, with the result being Contact or Engaged, both the attacking and defending units ignore the results. It is as if no attack had taken place.

When the question has come up, I have asked the player to consider the "walls" of a fortress impermeable to zones of control, except during the combat portion of a turn prior to the resolution of that attack. That is, during movement and after the attack is resolved, zones of control do not pass through the fort "walls." Zones of control pass through fort walls only during the execution of an attack.

Using this description, then, a unit in a fort can move one square outside the fort to an empty square even if surrounded by enemy units. A unit surrounded on five sides can retreat through a fort on the sixth side. A German unit adjacent to Sedan cannot prevent new US units from coming through Sedan since the German would not have the city in his ZOC. (Specifically, if German units were on H-35 and K-52, arriving US units could move through Sedan to I-52 or J-52 and attack the German units.)

It has never been clear to me just what a fortress in the game represents in reality. And, connected to that question, what are zones of control supposed to represent? For lack of something better, I have pictured ZOCs as representing the sphere of a unit's ability and willingness to engage in combat. The range of weapons cannot be a criterion; attacking implies a commitment of moving the bulk of the unit--be it regiment (Bulge), division (D-Day), or corps (Stalingrad)--toward the hex(es) being attacked. If this describes a ZOC, perhaps a fort (in the sense that its walls stop a ZOC) could be understood more as an attitude than as a physical construction. That is, a unit in a fort is not willing to commit its force to combat in an aggressive sense; no patrols in force are sent out, etc. The fact that a unit's defense factor is tripled is an effect of the physical works; the walls of the fort stopping ZOCs is an effect of the defender's more passive attitude.

Whether this interpretation was the intent of the designers, I do not know, but it does seem to hang together and make some sort of sense, but only in a limited way. It does not explain why the ZOC of a unit outside an empty fort does not extend into it, I am afraid, especially in cases when the attitude of that unit is very aggressive. For the sake of consistency and simplicity (two factors of not minor importance) we say it does not. (If ZOC did enter

an empty fort, an interesting paradox would arise. To wit: a German unit is adjacent to Sedan. Sedan is empty, so its ZOC enters that city. A US unit enters Sedan; it must stop, since it is in the ZOC of a German unit. However, when a unit is in a fort, ZOCs do not pass through the walls; therefore, the US unit does not have to stop. The result: it stops and does not stop.)

There has been much controversy over advances after combat. Not surprisingly, many are puzzled about advances when the defending unit is eliminated because of blocked retreat routes. The direction on the CRT says one thing, and the Appendix says exactly the opposite. The CRT says units can advance the full amount, even if retreat is blocked; the Appendix says advance one hex only. One cannot help wondering how both items came to appear in the same rules. My guess is that someone who had not read the rules carefully added the second item to the Appendix. When the question comes in to me, I say follow the Appendix ruling, since it is obviously the later one.

I personally prefer the CRT ruling, and in AHIKS we follow that one. There are several reasons. One, it is consistent with other games (Guadalcanal and Blitzkrieg). Two, why should the arrangement of one's own troops (some may not even be attacking) or the composition of nearby terrain affect the advancing of attacking units? It has been said the the advance should be only one hex because the attackers would have to mop up the defending units. This objection has merit, but I think that it is unrealistic to--in some cases--use three big panzer divisions to mop up one regiment. Also, I think that the mopping up is accounted for in the CRT itself. If the operation takes little time, the attacker can advance three or four hexes, but if it takes more time, the advance is only one or two hexes.

Can attacking units move into an enemy ZOC? My ruling has always been that the victorious unit can always advance into the vacated hex, regardless of enemy ZOC. If, in the vacated hex, the winner is not in an enemy ZOC, it can move the rest of the allotted advance.

There is a school of thought that believes strongly that after the first hex, units can still move into an enemy ZOC. The argument being that in some cases at least to move in any direction other than toward and adjacent to the enemy unit would not constitute an advance but a retreat. The key word here being "advance." They cite the rules, which say, "Units may advance directly into enemy controlled squares ONLY if no alternate advance routes are available; the others are retreat routes. Therefore, the winner can move adjacent to the enemy on the second, third or fourth square of its advance.

What does "advance" mean? I take it to mean "the movement of the winner after combat." The other school wants to impart some sense of direction to the word. But what direction? Perpendicular to the front line? But the front line is usually so convoluted that this can be very difficult to determine. Toward the Meuse? But what point on the Meuse, and, if you are attacking toward the south, you would, again, be advancing away from the unit you defeated. It seems to boil down to this when direction is inserted into the definition of "advance": the advance ends up being, "the direction I want to go." If I want to advance next to that strong point and make them retreat, then the rules should not stop me.

The rules do not always conform to our wishes of the moment. (Let me insert an aside here. Many of the most opinionated statements

come from people who play only one side in all games. They play only the German, say, in Bulge. Therefore, they want rules that make the German side stronger and stronger. When one plays one side as often as the other, he comes to be a bit more objective and a touch more tolerant of the other side's viewpoint.) For instance, armor cannot advance into or through woods hexes, although that is the way to the Meuse. Infantry cannot advance into a second rough-terrain hex, although that is the direction it wants to go. And, units cannot advance into enemy ZOC after the vacated hex because that is a rule, too, however annoying at the moment. When an advancing unit is faced with blocking terrain, it can stop short of using its full advance allotment, or it can veer to the side, or double back; it is forced by the circumstances to make one of these choices. The presence of an enemy unit is also one of those circumstances that forces a choice.

This discussion has been in reference to enemy units not attacked. The victorious unit can always advance adjacent to the unit it pushed back if it is not then also in the ZOC of another enemy unit. This can be explained by saying that the retreated unit would be too disorganized to stop the advance, but a unit that had been stationary would be prepared to do so.

No little confusion and controversy arose over movement in rough terrain in conjunction with roads. The original rules had seven paragraphs under Rough Terrain pertaining to this, but many questions were left unanswered. In the original rules, a unit clearly could not move from a clear hex to a road-and-rough-terrain hex and still continue on the road (if entry was made from a clear road hex, however, a unit could continue on the road). It was not explicitly stated until the Appendix was added that movement in the opposite direction was also illegal. That is, originally, a unit could move to an adjacent clear hex from a road-rough-terrain hex and keep on moving. It is this type of inconsistency that a game designer must watch out for.

This type of inconsistency is still present in this section of the rules. A unit begins its turn on a road and moves to a road-rough-terrain hex may move one hex off the road onto a rough-terrain hex, but may not move one hex off the road onto a clear hex. One would surely imagine that the latter move would be much easier than the former. So, here, the rule addition cleared up one problem (made the rule consistent for movement in both directions between clear hexes and road-rough-terrain hexes) but created a situation where a more difficult movement was allowed and an easier one disallowed.

All of these rules can be lived with if they are made clear. However, one is playing a game that is supposed to simulate real conditions, and conflicts between the rules and what we have experienced in reality do not sit well with us.

More thought should be put into any new game dealing with roads in rough terrain. Ken Norris suggested that a unit should stop on the first rough-terrain hex it moved into in all cases, even if it moved onto a hex in rough-terrain that contained a road, unless the unit started on a road. This makes sense. The road on the map-board is way out of scale; it is a small part of a hex that is mostly rough terrain. With this rule, however, a unit starting on a road can still move one hex off the road into rough-terrain but not onto clear terrain. To clear up that confusion, one would probably have to add a new rule stating that if a unit wanted to leave the road while the road was in rough terrain, then it would have to end

its turn on the road and proceed on the next turn--like stopping on the river at the point the unit expects to cross on the next turn.

But while one is adding new rules to clear up problems, he has to remember that there is a point of diminishing returns. Eventually the rules are so detailed as to be unplayable. I think that a very good reason for having rule A rather than rule B or C is simplicity. But strive for simplicity without contradictions and inconsistency.

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Deployment: A Critique

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Martin C. Campion

Simulations Publications Inc.'s Deployment is an intriguing, fast moving and variable game. Furthermore, it contains a number of innovations in board wargaming that ought to be remembered as game design concepts. All in all, a good value, with something for the player and the student of games alike. But I question the claim that it is a very accurate or adequate representation of the tactical conditions of European warfare from 1700 to 1815, give or take fifty years.

For one thing, it certainly can't claim such a large era for itself. There simply aren't enough kinds of units or rules to cover the changes in warfare that occurred between these two dates. It is true that weapons did not change much during the period, but they did change some and ways of using them changed more. Artillery is the best example. In 1700, artillery was far from having a dominant position on the battlefield. The guns were heavy and the horses that pulled them were normally led away before battle. The guns were then wrestled around on the battlefield by their crews. Consequently, they were not moved around much and were frequently captured by an enemy advance and perhaps recaptured in a counterattack. At any rate, it didn't make a great deal of difference in a battle. By 1800, however, artillery--at least the French artillery as reformed by Gribeauval--was mobile on the battlefield and frequently decisive in its effect. But Deployment only offers the powerful, mobile artillery of 1800 and probably exaggerates its power even for that date.

Similarly, there is the question of speed. The speed with which individual men could walk from place to place was fairly constant throughout the century, I suppose. But there is no doubt that the speed with which European generals could move disciplined, organized bodies of men around on the battlefield did vary considerably. In 1700, European infantry did not march in step. Therefore the speed at which a battalion could shuffle around on the battlefield was quite limited. The cadenced step was introduced into European armies around mid-century, at first in Prussia before 1740. With this innovation every kind of formation could move faster than it could before. But again Deployment offers insufficient variety to cover the whole era.

The designer has attempted to give us only one order of battle dealing with pre-French Revolutionary warfare: the Battle of Leuthen, but the game pieces cannot easily be adj-

usted to that battle. Therefore, since the Austrians were actually given one of Napoleon's armies in disguise, the result should be more like Jena than Leuthen.

So, let us dispose of the designer's excessive claim to more than a century and take Deployment as a game which deals with warfare between 1792 and 1815, a somewhat more manageable period in which tactics were fairly constant while warfare was almost continual. But there are still some difficulties in the game's design.

One of the major problems, I think, is the board. It shows too obviously that it is an imaginary scene. It should have been based on a study of actual battlefields of the Napoleonic wars. The villages seem to be out of proportion. Compare the 1 hexagon (100m x 100m, or c. 109 yards by 109 yards) villages of Deployment with some real villages shown in A MILITARY HISTORY AND ATLAS OF THE NAPOLEONIC WARS: Marengo was $\frac{1}{2}$ mile by $\frac{1}{2}$ mile, or 4 hexes by 4 hexes; Eylau was 500 yards by 500 yards, or $4\frac{1}{2}$ hexes by $4\frac{1}{2}$ hexes; Friedland was 700 yards by 600 yards, or 6 hexes by 5 hexes; Aspern was $\frac{1}{2}$ mile by $\frac{1}{2}$ mile, or 8 hexes by 4 hexes; Ligny was 1,000 yards by 600 yards, or 9 hexes by 5 hexes. The villages, I think, should have been made larger. Then they would be more important--as they should be.

The fort on the Deployment battlefield is a mystery to me. I cannot recall that such a powerful, yet minute permanent fortification played any part in any battle around this time. Maybe there were such things but surely it should have been made a unit so it could be removed or moved, rather than a permanent part of the landscape.

Actually, the best thing to do with the Deployment game board is to leave it folded. Then get a blank hex sheet from Simulations Publications (\$8.00 a dozen) and cover it with transparent self-stick plastic. Then take a blue and green "Vis-a-Vis" marker (do not use red since it will not come off) and a map of some battlefield, and draw a section of that map on the plastic to scale. When you want to change battlefields, take a wet cloth and erase the markings.

Then, there are some difficulties with the rules, the most general one being that they are too simple. Over simplified games have their place in wargaming, but to think of Deployment as belonging to the same series as masterpieces of playable complexity such as Tac 14 or Tac 3/PanzerElitz is absurd. But even over-simplifications should give some feeling for the reality of the situation and here Deployment succeeds some and fails more.

One of the failures involves the use of terrain features. In the game it is a good idea to put guns up on hilltops because this increases their range by half. This is fantastic. The hills on the board have to be gradual ones since their slopes are only 100 to 200 meters across and if they were very steep they would be inaccessible to guns. But for range to be increased appreciably the hills would have to be mountainous. However, maybe we are not dealing with range at all but with a vaguer idea called "effective range" (the ranges given in the game correspond closely with the effective ranges given in David Chandler's CAMPAIGNS OF NAPOLEON). If this is so, then

the rule is even more at fault, because dragging a gun up a hill decreased its long range effectiveness, rather than increased it. A gun firing solid round shot, as these guns did at long range, was most effective if it could fire along a perfectly flat terrain, because then the maximum number of enemy bodies would lie along the line of flight of the shot. The maximum use could be gotten out of such a shot by skipping it along the ground--this was called ricochet firing. But a round shot fired from a hill would enter an enemy formation at an angle, causing minimum casualties and then would hit the ground at an angle and tend to bury itself.

But guns were sometimes placed on hilltops and there were some advantages involved. It gave the gunners an advantage in seeing and, of course, they couldn't shoot anything they couldn't see. Another advantage was that standing on a height tended to disarm the enemy artillery. Ordinary field pieces could not be elevated over 15° and could hardly be aimed and fired at any kind of height. Furthermore, a slope would slow down any attacking infantry or cavalry and allow more shots at them. Most of these remarks on guns, of course, do not apply to the howitzers which are included in the game, as they were capable of high-angle fire and since they used shells, the effect of which did not depend on a flat trajectory.

Generally, I think the artillery is too powerful in the play of Deployment. This is shown particularly by the fact that it is possible in the game to destroy enemy formations by firing at them long distance with round shot. This is very unrealistic. Cannon of the period did most of their damage with cannister, rather than round shot. Round shot was a delaying any annoying ammunition, rather than a destroying ammunition. Its power in terms of the game should be limited to dispersing, rather than eliminating. But even the cannister seems to be much too destructive. Again, artillery could repulse attacks and cause casualties at ranges of 400m to 600m, but it was not until the enemy got to 100m to 300m that a battalion-sized unit could be rendered unfit for further service in a particular battle.

The next series of comments come under the heading of infantry formations. One difficulty is that the game makes it too time consuming to change formations. I have been unable to discover how long one move in the game is supposed to be, but in the French (blue) army, it takes just as long to change from column to line in place as it does to move a column 500m to 700m. But the French were using the maneuvering system advocated by Guibert in the late 18th Century. To be brief, they could form a line from a column ahead of and at any angle to the line of march of the column. So they could form a line to the front in the time it took for the rearmost part of the column to march to the farthest part of the projected line. I do not think that units changing formation should be required to stop dead while doing it. The only limit I would put on formation changes would be that each unit could only change once per move so that a unit could not move from line to column and back to line again in the same move. This means, also, that a newly formed line would be just as capable of firing as an old one at the end of its move, if firing after movement is to be allowed at all. Then the French would be able to carry out one of their favorite tactics by marching up to firing distance in column and deploying for a fire fight.

Which brings us to the famous question of fire versus shock, or ordre mince versus ordre profond, or line versus column. Unfortunately, the designer of Deployment voted firmly in favor of column infantry assaults. If two battalions of Blue Guard in column formation (4-7 each) charge a Red Guard infantry battalion in line formation (defense value of 2), they have a 1-4 chance of destroying it with two 2-1 attacks and they have a 3-4 chance of at least dispersing it so that it cannot fire on them in its own turn. In fact, the French were not that successful when they tried simple column assaults against unshaken enemy lines. Indeed, French tactical doctrine did not envision such things. Instead of either column or line, the French at their best used both together. The first problem was to deploy a line to meet the fire of the enemy line; and, in later Napoleonic battles, to deploy masses of artillery to weaken the enemy line. Then, when the enemy line was already shaken, the columns might move forward with a chance of success. If they were successful, it was because the enemy was too discouraged to shoot at the columns and instead turned and ran. A line of infantrymen who kept coll and fired would not only hold, but would do terrible execution on the advancing columns.

The solution to this problem, I think, lies in the kind of phased fire and movement that characterizes Tac 14 and Panzer-Plitz. These two games demonstrate clearly that combinations of different kinds of attacks are much more effective than most simple attacks. Something like this might work realistically: Player A fires all units that he wishes to fire, then he moves all units that he wants to move, then he resolves any close combats that his movement has caused. Normally, the latter would be conflicts of morale, rather than bayonet fights, but the rule would be the same in any case. Then Player B would do the same. The combat results table would have many "disperses" for effective firing and it would contain few rewards of any kind for close combat against an undispersed enemy. But it would give a good chance for elimination in close combat against a dispersed enemy. The new rules should also allow for the doubling of all fire against columns, not just artillery fire. Then, they would have to allow some firing by columns, at a reduced effectiveness, of course, and for shock action by the lines, since the British did charge forward in line after firing.

There are two kinds of fighting formations that have been left completely out of Deployment and they should not be, even in the name of simplicity. The infantry square was of greatest importance. It was used regularly in Napoleonic battles by infantry when charged by cavalry, to prevent the cavalry from finding a weak flank to charge. The battalion square should be a single hexagon formation, but with a new counter to distinguish it from the column. It moves slower than the column but faster than the line and defends on all sides with the power of the line attacked from the front. It would fire at reduced effectiveness, just as the column, but it would be capable of executing four separate firings--one for each side. There might also be a provision for the formation of reinforced regimental squares using four battalions, or brigade squares using six.

The other kind of formation left out of the Deployment order of battle is the skirmishing order. Sometimes skirmishers

were detachments of battalions and those can be considered as incorporated in the battalions' combat factor in an abstract way. But often whole battalions or even regiments were broken into skirmish order. There is one possible reason for disregarding this kind of formation: when both sides used large numbers of skirmishers they simply cancelled each other out. But in some of the situations which arose, the French skirmishers alone were powerful and they did help prepare the attack. A skirmishing unit would be the same size as a line unit--the line would not take all the depth allotted to it--but would have a higher defensive value and a higher firepower (because of the dispersion). The Deployment set contains equal numbers of columns and lines to substitute for each other, but squares and skirmishers could easily be in shorter supply--there would seldom be a desire to put one's whole force in either formation.

The cavalry charge is handled fairly well in Deployment, except for one thing: it is important to charge the enemy and it is important to retain a reserve to make a second charge, but the cavalry unit which makes the first move towards the enemy is subject to the enemy's charge, which it has to take as if it were standing still. I would suggest that a cavalry unit which has moved towards the enemy in its turn be considered as charging--although not actually moving--during the subsequent enemy turn. So if the enemy cavalry charges it, the two forces would have equal combat factors.

Then there is the question of cavalry formations. Cavalry, like infantry, could go into battle in different formations. But since formations had somewhat less importance, it may be well to hold down the cavalry to a single type of unit. But I am unhappy with the choice made in Deployment. The cavalry unit represents 1,000 men and occupies one hex. That means that it occupies a front of 100m, which gives it a front of about 100 men and a depth of ten ranks. It would be possible to squeeze the men and horses into such a formation, but it would not, I think, be a normal formation for charging. However, the flexibility of a single hex-sized unit is desirable for cavalry, which can have a great effect against infantry only when attacking flanks or penetrating gaps. So I would keep the same units, but make them represent 500, half a regiment or 2 squadrons. Like infantry columns they would have little effect in frontal assault against undispersed infantry, but would have a great effect against dispersed infantry.

Further complications in cavalry could be introduced: dragoons who would be able to fight dismounted, Cossaks and other irregular cavalry who would act as skirmishers on horseback, and carabiniers who could have some firepower from the saddle.

The idea of multiple attacks in Deployment was a good one. It reflected the fact that a unit is more vulnerable to a quick succession of shocks than to one massive shock. However, I think, as noted above, that a phase system would be better, because a succession of the different kinds of attacks is more disruptive than a succession of the same kind. It may be that the two ideas should be combined and we would have multiple fire attacks followed by multiple close combat attacks. This, if the gradations could be made fine enough, would reflect reality best.

In the present system of Deployment, a unit that is dispersed must stay where it is. I think it should be allowed to retire, but since it is using up energy in retreating, it would not be able to reorganize and it would have to remain dispersed for one more turn. Such units would be allowed to pass through friendly units in the rear, so that they enemy would have to deal with fresh formations instead of dispersed ones. Then there would be a good reason for keeping a reserve, which would perform its historic function of relieving the first line in a critical junction and perhaps stabilizing the battle line.

Flank attacks and rear attacks are naturally the most effective kinds of attack in Deployment, but sometimes they can be unrealistically performed. A unit threatened by a flank attack could usually see it coming and take appropriate steps to meet it, unless it had other problems in a different direction. So I suggest something like this: a unit attacked from only one direction can rotate so as to get the best odds before his opponent resolves any combat. In the case of infantry lines, this would be subject to the availability of sufficient space to perform this maneuver. If a phase system were in use, the rotation could come only after the enemy movement phase.

Finally, I can end with one relatively minor point. I have tried for years now but I have failed to believe that a group of men can run twice as fast on a road as they can over relatively flat, unbroken, natural terrain. I would slow down the road bonus for men and horses in the case of this game, particularly because the original movement factor for infantry in column and for cavalry is large. Something like this would help and still be workable: for every two hexes of its basic movement factor that a unit takes along a road, it gets one bonus movement factor that also must be taken in sequence along adjacent sections of road or town hexes. If you move only one hex on a road you can't save it up, however, and if you move two, but then want to leave the road, you can't save that either.

What can be done about these suggestions? I thought of writing them up in the form of a variation of Deployment, but I do not now believe that that is desirable. In order to be happy, I would want to drastically change the board, the rules, and the pieces. That goes beyond variation and into the creation of a new game, although with many debts to the old one. Such a situation would require a new name, but perhaps the debts could be acknowledged at the same time: Deployment II anyone?

BIBLIOGRAPHY: I have only begun reading about the warfare of the era of the flintlock, and I reserve the right to change my mind on any of the beliefs expressed in this article, with or without further reading. However, the reader of this possible ephemeral article deserves to know what, at this moment, I have depended on most in the formation of my opinions. David Chandler has an excellent section on tactics and organization in THE CAMPAIGNS OF NAPOLEON (1966), but he generally stops just when he is getting down to the essential details, and, on the question of the use of columns by the French, he seems to be trying to say two opposing things at the same time. The essential work on French tactical doctrine is Robert S. Quimby's BACKGROUND OF NAPOLEONIC WARFARE (1957). A very similar book, with a few different details, is J. Colin's L'INFANTERIE AU XVIIIe SIECLE: LA TACTIQUE (1906). A very enlightening book

for the game designer is the work of the thoughtful and observant contemporary, Jomini, *THE ART OF WAR*, as it was called in Philadelphia edition of 1862. Then, it was very helpful to consider the tactical ideas of an earlier observer and actor in Jay Luvaas' *FREDERICK THE GREAT ON THE ART OF WAR* (1966).

For artillery, I have used E. Picard, *L'ARTILLERIE FRANCAISE AU XVIIIe SIECLE* (1906), which takes the artillery only up to 1789.

For cavalry, I have tried to force information out of two insufficiently detailed, although suggestive, general works, G.T. Denison, *HISTORY OF CAVALRY* (1970) and Gerome, *ESSAI HISTORIQUE SUR LA TACTIQUE: CAVALLERIE* (19??). Oliver L. Spaulding et al., *WARFARE* (1939) has a good survey of tactics before the French Revolution and E.N. Ipyd, *A REVIEW OF THE HISTORY OF INFANTRY* (1908) is interesting, but like all general works insufficiently detailed. *A MILITARY HISTORY AND ATLAS OF THE NAPOLEONIC WARS* (1964) a West Point textbook by Vincent J. Esposito and John R. Elting, has beautiful maps although its text is not very helpful.

Editor's Note:

Prof. Campion's notes on Deployment are presented here even as a total redesign of that game goes forward. Indeed the new version, GRENADE, is virtually a new game having but little in common with Deployment. The redesign has already taken many of Prof. Campion's proposals under study and many other innovations are to be incorporated as well.

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The Mathematical Derivation of a Combat Results Table ④

RICHARD BAUER

Despite the current demands for and advances toward greater realism, the combat result tables still in use are archaic and unrealistic approximations, based on their designer's intuition, prejudices and guesswork. The difficulty is that little specific information is available about the probable number of casualties that will result from a given battle. This article will investigate this problem and apply the results it obtains to design a more accurate CRT. To this end, let us consider the following situation: A Red force of strength A (measured in men, battalions, combat strength or any other suitable unit) attacks a Blue force of strength B (in similar units); the battle lasts t days. Our problem is to determine the number of casualties each side suffers during the battle. Let us first observe that the strengths, A and B , are functions of time. That is, they vary with time. As time elapses, both A and B decrease as

each side sustains casualties. It is convenient to let A_0 represent Red strength at the beginning of the battle and B_0 represent Blue strength then. Thus, we say: $A=A_0$ and $B=B_0$ when $t=0$ (0)

It would aid our purpose if we could determine equations which would give us the values of A and B for any t. To make the derivation of these equations possible, we introduce our basic assumption: THE RATE AT WHICH A COMBAT FORCE SUFFERS CASUALTIES IS DIRECTLY PROPORTIONAL TO ITS ENEMY'S STRENGTH.

What this means in our hypothetical situation is that there exist constants r and s such that the rate at which Red suffers casualties will equal rB per day and the rate at which Blue suffers casualties will be sA per day. Now the rate at which a combat force suffers is the rate at which that force is changing (in size) with respect to time. In mathematics such a rate of change is called a derivative. The rate of change of the Red force with respect to time is called the derivative of A with respect to time and customarily designated

$$D_t A \text{ or } \frac{dA}{dt}$$

Similarly, the rate of change of the Blue force with respect to time is designated $D_t B$. Our basic assumption can then be interpreted as:

$$D_t A = -rB \text{ and } D_t B = -sA \quad (1)$$

The minus signs are used since both A and B will decrease with time and must therefore have negative derivatives. Applying the methods of differential calculus to equations (1) above to take the derivative of each, we get

$$D_t^2 A = -rD_t B = -r(-sA) = rsA \quad (2)$$

$$D_t^2 B = -sD_t A = -s(-rB) = rsB \quad (3)$$

where D_t^2 represents the second derivative; i.e., derivative of the derivative. From the area of mathematics called differential equations it is known that the general solution of the differential equation

$$D_t y = m^2 y \quad (4)$$

$$\text{is } y = C_1 \cosh(mt) + C_2 \sinh(mt) \quad (5)$$

where C_1 and C_2 are unknown constants. The cosh and sinh referred to in the equation are, respectively, the hyperbolic cosine and hyperbolic sine, mathematical functions whose exact values for specific values of mt can be determined from tables in the Handbook of Chemistry and Physics. Since both A and B satisfy a differential equation of the type in (4) above, see equations (2) and (3), they must be given by equations like (5) above, namely:

$$A = C_1 \cosh(mt) + C_2 \sinh(mt) \quad (6)$$

$$B = K_1 \cosh(mt) + K_2 \sinh(mt) \quad (7)$$

where here $m = \sqrt{rs}$. The constants C_1 , C_2 , K_1 and K_2 can be determined using the information given in equations (0) and (1). For example, since $A = A_0$ when $t=0$ and since $\cosh(0)=1$ and $\sinh(0)=0$, we get

$$A_0 = C_1 \cosh(0) + C_2 \sinh(0) = C_1$$

A complete evaluation of all the constants yields

$$A = A_0 \cosh(mt) - \frac{r}{m} B_0 \sinh(mt) \quad (8)$$

$$B = B_0 \cosh(mt) - \frac{s}{m} A_0 \sinh(mt) \quad (9)$$

These equations give us the remaining strengths of Red, A, and Blue, B, after t days of combat. We wished to know the casualties which each side has suffered and these will obviously be

$$L(A) = A_0 - A = A_0[1 - \cosh(mt)] + \frac{r}{m} B_0 \sinh(mt) \quad (10)$$

for the attacking Red and

$$L(B) = B_0 - B + B_0[1 - \cosh(mt)] + \frac{s}{m} A_0 \sinh(mt) \quad (11)$$

for the defending Blue. Equations (10) and (11) are then the equations which give us the losses when an attacking force of initial strength A_0 engages a defending force of initial strength B_0 for a period of t days.

To apply these formulas, we must know r, s and $m = rs$. The number r is the number of casualties each defender will inflict on the attacker per day and s is the number of casualties each attacker will inflict on the defending force in a 24 hour interval. These figures should be determined from an analysis of combat data. Since this data is not available to the author, we will resort to our intuition. It is a nearly universal assumption among wargamers that $r = 2s$, that is, the defender's fire power will inflict twice as many casualties as the attacker's.

Subscribing to this opinion, we immediately obtain

$$\frac{r}{m} = \sqrt{2} = 1.414 \quad \text{and} \quad \frac{s}{m} = 1/\sqrt{2} = 0.707$$

For reasons that will become apparent later, we will further assume that

$$r = 0.046 \quad \text{and} \quad s = 0.023$$

Since t is to equal the duration of the battle in days, its value must be adjusted to the interval of time that one turn in the game is to represent. If we wish to develop a CRT for BLITZKRIEG where one turn represents approximately 10 days in the module system, the value $t = 5$ would be acceptable since each battle is resolved during a half turn.

This gives

$$mt = t \sqrt{ab} = 5 \sqrt{(0.046)(0.023)} = 0.160$$

Referring to the mathematical tables we find

$$\cosh(0.160) = 1.013 \quad \text{and} \quad \sinh(0.160) = 0.161$$

Equations (10) and (11) can be restated as

$$L(A) = -(0.013)A_0 + (0.228)B_0 \quad (10')$$

$$L(B) = -(0.013)B_0 + (0.114)A_0 \quad (11')$$