nance officer (BMO), who is responsible for its composition and security.

What is the composition of the UMCP?

Its composition is not fixed, but depends on the BMO's analysis of both the tactical and the maintenance situations. The maintenance resources in each of the company trains (recovery vehicles, tools, test equipment, and personnel) and the maintenance resources required in the field trains must be taken into consideration. Because of the limited maintenance resources available to the battalion, there can be no waste. The BMO must see that the right resources are at the right place on the battlefield at the right time. If the need develops for more maintenance resources in an echelon, the BMO must shift the maintenance platoon's resources to meet that need.

In addition to the resources of the maintenance platoon, damaged vehicles and their crews are also present in the UMCP, and the BMO must take action to ensure that these vehicles and crews do not accumulate. The UMCP should never become so large that it cannot displace rapidly to new locations.

What can be done to control the size of the UMCP?

Its size can be controlled through the following actions:

- Having only essential maintenance resources present.
- Evacuating to the field trains maintenance site any damaged equipment that cannot be repaired within six hours of its arrival.
- Performing only mission essential maintenance.
- Having effective maintenance resources in the company trains.

Where should the UMCP be located?

It should be somewhere along the battalion's main supply route and close to the combat trains. The guidelines for locating and moving the combat trains in the offense and defense also apply to the UMCP. In fact, the combat trains and the UMCP may be located together.

Field Trains

What is the organization of the field trains?

The field trains contain the headquarters company (HHC) command post, the battalion supply section, the mess sections (centralized), the support platoon headquarters, and all of the remaining vehicles and supplies of the support platoon not found in the combat trains. Also found here are the remaining elements of the maintenance platoon and all the company supply sections.

Support platoon supply vehicles in the field trains should always be loaded. Loaded ammunition vehicles should be positioned away from the maintenance area and the Class III point to prevent traffic congestion and improve safety. The Class III point should be near the maintenance area.

When the mess section is centralized, the mess teams should be located together, because more meals can be prepared with less effort and resources. When the mess section is decentralized, a Class I distribution point is needed to break down rations into company lots.

The maintenance platoon assets that are not needed in the company trains or the UMCP operate from one location in the field trains. Ideally, this site should be on the edge of the field trains to reduce traffic congestion and in fixed facilities to reduce the trains' noise and light signature.

Where are the battalion field trains located?

The battalion field trains operate from a location in the brigade support area (BSA) that is designated by the brigade S-4. The maneuver battalion's headquarters company commander is in charge of the field trains, and he designates the exact location of each element in the trains. He is responsible for ensuring that the internal defense plan of the field trains is developed and tied into the BSA defensive plan. He also controls vehicle movement into and out of the field trains, and should establish a road network that allows one-way traffic into and out of the area.

These questions and answers provide an overview of the subject of battalion trains as they are generally organized and employed in the AirLand Battle doctrine. The application of these guidelines depends, of course, on many variable aspects of the battlefield.

Captain Steve Brasler teaches logistics to Infantry Officer Advanced Course students at the Infantry School.

Rail Movement Spreadsheet

CAPTAIN CHARLES B. PELTO

An Army logistician—an infantry battalion or brigade S-4, for example—often has to do things he has never done before, especially when logistics is not his primary specialty. And sometimes he wishes he had never been given a particular "opportunity to excel"—such as planning to ship all his unit's equipment by train to the National Training Center (NTC) in California for its training cycle there. (Once he does it, he probably hopes he never has to do it again. But he knows he will—it is just a matter of time.) For many logisticians who have never even ridden on a train, this task can be a real nightmare.

This operation may not be too difficult for those battalion S-4s in Germany who do this sort of thing all of the time. Their battalions usually take everything they have with them when they go to Grafenwoehr, for instance, so they know exactly how much train space they will need for that equipment. In fact, their load plans have been worked out in considerable detail over the years and are practiced constantly.

But things are different in the States. Whatever training is conducted takes place on an installation, and trains are considered to be in the realm of the installation transportation officer (ITO). Before NTC, an S-4 didn't have to know much about trains to make a shipment. All he had to do was fill in the blanks on some forms, turn the forms over to the ITO several months before the planned shipping date, and then count on the proper number of rail cars to be spotted at the proper time. There was some manual labor, of course, and some loading had to be done. But the ITO usually took care of the major problems, like ordering the cars.

BROADENED

Now, though, in the days of NTC, an S-4's job has been broadened considerably and having to plan train loads has become a mandatory, recurring activity for every infantry and armor combat unit. For everyone except the S-4, getting to the NTC can be a pleasant, if different, experience. For the S-4, getting to the NTC is not nearly as pleasant and requires him to make an agonizing analysis of the material his unit can expect to draw at the NTC and then to identify those things his unit must take to fill out, let's say, a brigade task force. Here's how the process usually works:

At about D minus 100, the brigade determines the minimum amount of equipment it must have at the NTC if its exercise is to succeed. (This list is developed by the S-4 from information provided by the task force's subordinate units.) About 10 days later, the NTC sends the brigade logistician the latest operational readiness (OR) information, from which he can get an initial estimate of the amount of equipment that will be available to the brigade once it arrives.

The problem is that at least three other units will be using that equipment in the meantime, and he does not know exactly what will be available 90 days later. This forces him to do some second guessing, especially on low density items such as combat engineer vehicles and armored vehicle launched bridges.

By comparing the brigade's list of minimum requirements with the OR list provided by the NTC staff, he can decide on the types and quantities of equipment he has to ship. With this filler list in hand, he then goes to his installation transportation officer (ITO) and gets a picture of what the train will be like. This must occur at about D minus 67.

The final OR list from the NTC comes at D minus 30. This will be the last official report and the most important to the submission of equipment lists to the ITO.

A week or two later, after many manhours of work compiling data, the ITO will be able to tell the logistics officer how many rail cars, by type, will be in the train. (He may also tell the logistics officer that he would rather not see him again on this subject, but that is just wishful thinking.)

The ITO knows all about the changes that are bound to come, both from the NTC and from the task force itself. In the course of this preparation, most of the unit commanders in the task force will review their equipment lists and probably ask for "minor" changes that cumulatively will equal *major* changes. As a result, the logistics officer will be in constant touch with the ITO asking questions and asking that modifications to the equipment list be processed to determine their effect on the makeup of the train.

To say at a certain point that there will be no more changes ignores the fact that commanders tell their staffs what to do, not the other way around. Although commanders can help keep changes to a minimum if they take certain steps, nothing can be done to prevent changes in the status of the equipment at the NTC.

Clearly, then, these changes must be managed at brigade level, and someone has to do it. It is difficult or impossible for the ITO to give the brigade a dedicated train planning expert. The brigade S-4 shop has a number of people, but they will have enough to do just staying on top of routine operations and usually do not have the training for the job in any case. Although the brigade may be able to pull a bright officer in to do this job, spare officers are usually rare in a combat brigade.

SADDLED

It is more likely, therefore, that the brigade logistics officer will find himself saddled with the mission without any additional resources and will have to learn as he goes along. If he does not get some support, though, he can expect to spend many nights at headquarters trying to redesign his train on the basis of the changes requested that day. (In fact, he may as well ask the supply sergeant for a cot and kiss his family good-bye for the duration.)

Much of this can be prevented, fortunately, with the application of certain decision making tools such as a microcomputer and an electronic spreadsheet program.

With these two items the logistician can prepare an electronic spreadsheet that will perform all the necessary arithmetic calculations to determine if a proposed change will go beyond the limits of both the train size and the budget.

The brigade logistics officer, after studying the computer and the program, can take an already prepared template for planning the train configuration, load in key information involving the equipment required and the equipment available, identify the units that are to take their own equipment and the equipment itself, and let the program determine the size of the train. The program can then calculate, in just minutes, the effect of any proposed changes and alert the S-4 if they will violate his constraints.

Rail cars for major movements usually are leased to the Government by commercial railroads at a set price. Each car costs the same, whether it is a commercial gondola or an official Department of

Defense oversized flatcar (called a DODX). Using the rate for the train that went from his installation to the NTC most recently, the logistics officer can estimate, with reasonable accuracy, the cost of the movement. (This information is most readily available from the installation Comptroller's office.) The ITO may get a slightly different price when the Military Traffic Management Command (MTMC) comes back with the contract, but that is not of critical importance. The budget people at installation level understand that such differences exist between estimated and actual costs.

The real benefit of this system is that the logistics officer can now answer a call from one of the unit commanders or executive officers and tell him within minutes if a proposed change will cause an unacceptable increase in the size of the train. He can do this without having to go to the ITO and without having to spend extra hours in the office at night.

The logistics officer can also carry on with his routine operations, keep the subordinate units of the brigade task force happy, keep the budget officers at division and installation levels informed of cost estimates, and also keep the brigade commander abreast of everything.

With a good printer, a hard copy of the spreadsheet can be generated, duplicated, and distributed to help keep the subordinate units fully informed about their portion of the train. They will be able to spot any discrepancies immediately and call in their corrections.

SPREADSHEET

The spreadsheet (see example) is divided into two distinct portions. Each portion deals with a specific aspect of the activity and is further divided into groups of columns, each of which addresses a specific function.

The upper portion of the entire spreadsheet deals with the equipment that the brigade task force must use while on the ground in the exercise. It is divided into three groups of columns arranged from left to right.

The first group of seven columns identifies the types of equipment by nomenclature, model number, line item number (LIN), length, width, height, and weight. This information, organized according to LIN, is useful in preparing the load lists that the ITO will want later. So when a unit calls and asks for a change, if they refer to the item by number, it will be easy to find. The operator does not need to make any entries in these columns.

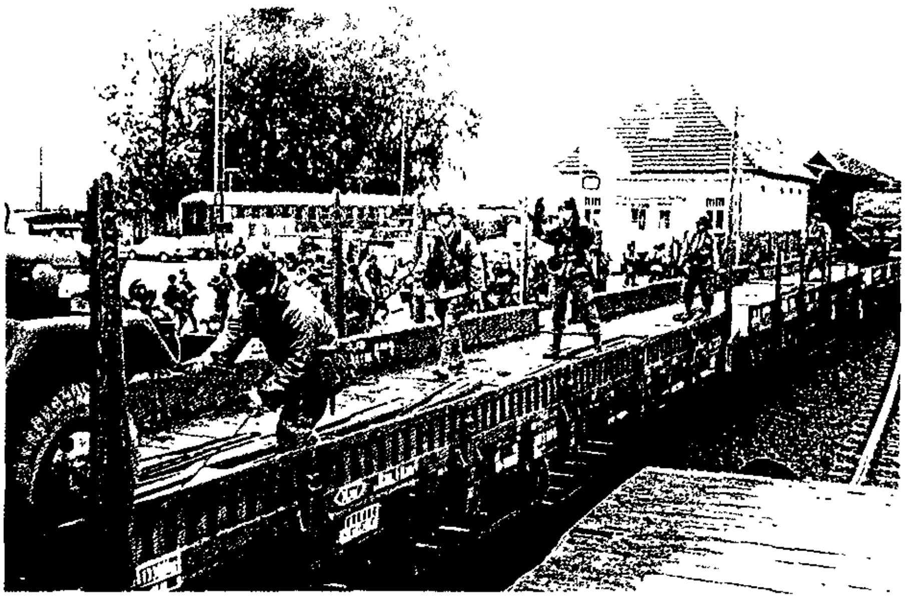
The second group of five columns shows the quantities of equipment that must be considered for transportation. Here the operator enters the information about the equipment the brigade task force will need in the "Quantity Required" column and what is available at the NTC in the "Quantity Available" column. The program will tell the operator how many items he has to add to or subtract from the planned amounts in the "Adjustments" column. The "Quantity Planned" column is a tabulation of the data from the third group of columns.

This third and final group in the top portion specifically identifies the units that will be participating in the exercise. In the example provided, generic units have been used. The operator, with a lit-

RAIL CAR REQUIREMENTS PLANNING (EXAMPLE)

NOMEN	MODEL #	LIN	LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	WEIGHT (POUNDS)	QUANTITY REQUIRED	QUANTITY AVAILABLE	QUANTITY TO BRING	QUANTITY PLANNED	ADJUSTMENTS	HHC BDE	IN	AR	FA	ENG	ADA	FWD SPT BN	CAV	MI	SIG	MP
CONEX	LARGE	C13311	102.0	75.0	82.5	10000	90	0	90	90	0	4	18	19	14	6	8	16		1	1	3
AVLB	M-60	C20414	402.5	158.0	70.0	29300	2	0	2	2	0					2						
CARR MORT	M-125	D10276	191.5	100.0	84.8	20419	0	0	0	0	0											
CARR MORT	M-106	D10741	191.5	99.6	85.0	20131	12	8	4	3	1		1	2								
CARR CGO	M-548	D11049	232.0	100.0	76.8	16774	22	10	12	7	5				6		1					
CARR CP	M-577	D11538	191.5	100.0	104.0	22548	32	15	17	16	1	3	5	5	3							
CARR PERS	M-113	D12087	191.5	99.6	84.0	18940	108	94	14	10	4	1	3	1	1			4				
CEV	M-728	E56578	289.0	143.5	127.8	110560	2	1	1	2	-1					2						
ITV	M-901	E56896	190.5	100.0	103.0	23500	26	26	0	0	[illegible]											
SHEL ELEC	M-147	H01912	148.0	86.8	83.0	3010	0	[illegible]	[illegible]	[illegible]	[illegible]	4			[illegible]	4		10			3	
GEN SET	ANY TYPE	J49089	EXACT DATA VARIES WITH MODEL #				[illegible]	[illegible]	14	14	0	1	1	1	1			10				
GUN ARTY	M-163A1	J96694	190.0	[illegible]	[illegible]	[illegible]	21	18	3	2	1			1	1							
HOWITZER	[illegible]	[illegible]	[illegible]	97.8	88.8	22244	7	3	4	5	-1					5						
[illegible]	[illegible]	X48914	268.0	103.0	126.0	25875	9	3	6	7	-1							7				
TRK FS	M-49C	X57271	263.3	95.9	91.9	14135	0	0	0	0	0											
TRK FS	M-559	X58078	391.8	108.3	100.3	27345	10	5	5	5	0		1	3	1							
TRK TRCTR	M-52A2	X59326	258.3	98.3	85.9	17960	32	15	17	17	0			4				13				
TRK TRCTR	M-123A1C	X59874	289.4	114.8	93.0	30082	0	0	0	0	0											
TRK UTIL	M-151A2	X60833	131.5	64.0	52.5	2450	91	50	41	24	17		4	2	1	2	2			2	1	10
TRK EXP	M-820A2	X62271	368.8	98.5	137.1	29495	7	1	6	6	0							6				
TRK SHOP	M-109A3	X62340	264.8	99.5	130.0	15760	16	4	12	12	0							12				
TRK WRKR	M-543A2	X63299	349.0	98.0	104.9	33998	8	6	2	2	0							2				
TRK WRKR	M-553	X63436	400.8	108.3	117.3	39789	4	1	3	3	0		1		1			1				
							1219	619	600	530	70	20	73	82	78	28	18	185	0	9	13	24

RAIL CAR	CAPACITY	TYPE EQUIPMENT	EQUIP QTY'S	UNUSED SPACE	ADDITIONAL ITEMS	TOTAL # CARS	PER CAR COST	TRAIN COST ($000)
DODX	1	OVERSIZE	5	0.00	0	5		
DODX	2	OVERSIZE	14	0.00	0	7		
FLATBED	2	LRG TRCK	16	0.00	0	8		
FLATBED	2	LRG WHL	31	-0.50	1	16		
FLATBED	3	WHL/TRCK	48	0.00	0	16		
FLATBED	3	WHL/TRCK	255	0.00	0	85		
PIGGYBACK	2	SEMI-TRLR	25	-0.50	1	13		
TRI-LEVEL	21	SML WHL	44	-0.90	19	3		
GONDOLA	8	CONEX'S	90	-0.75	6	12		
GONDOLA	1	AVLB'S	2	0.00	0	2		
		TOTALS	530		27	167	2900	484.3



Members of the 1st Battalion, 24th Infantry, in Germany for REFORGER exercises, secure their vehicles on flat cars.

tle effort, can apply actual unit designations and additional units through procedures described in the program manual that comes with the spreadsheet's software.

The operator, based on his knowledge of unit TOEs and reference materials, will designate the number of items to be brought by rail to the exercise site. This is done by cross-referencing the unit column with the row for a specific item of equipment and entering the desired number. The program will automatically adjust all the figures in the upper portion of the spreadsheet accordingly.

When the "Adjustments" column reads "0" from top to bottom, the operator has identified all the equipment that has to be taken along to supplement the equipment identified as available at the NTC.

The lower portion of the spreadsheet provides the critical output information about the nature of the train. Here the area is divided into four groups:

From left to right, the first group of three columns gives basic information about the various rail cars for rapid reference. No entries are made here by the operator.

The second group consists of one column. Most of the critical calculations on rail car requirements are shown here as totals of the different types of equipment that can go on a corresponding type of rail car.

Thus the computer looks at the items of equipment and, based on various formulas, determines what type of rail car they will be loaded on. For example, M1 and M60 tanks, M88 tracked recovery vehicles, and other oversized loads are placed on DODX flat cars. Quarter-ton trucks and their trailers are usually placed on tri-level cars that will accommodate 21 items, while semi-trailers are loaded onto commercial piggy-back cars, each of which will carry two trailers. Eight CONEX containers will fit in a standard gondola car, while one bridge structure from the AVLB will fit on a gondola.

Most of the rest of the equipment will fit three items to a standard flat car. Although the ITO may state that such cars come in different lengths and that they can conceivably take more equipment, even he uses three items per car as a rule of thumb and accommodates the different types of equipment by requesting different-sized flat cars. (As with all rules, there are exceptions. The five-ton cargo trucks, for example, will usually wind up being placed two per flat car.)

All of this is based upon information derived from assorted Army publications involving lengths of vehicles and other equipment and also from information gathered from ITO load-planning techniques. For additional information on equipment not listed in manuals in the office, the logistics officer should consult with the ITO.

The third block of data in this portion has two columns. They show calculations on the unused space on each type of car and how many additional items can be accommodated. The operator does not make any entries here.

The fourth group tells the operator how many rail cars, by type, will be needed to carry the planned equipment to the exercise site and carries the information out to the estimated cost for the train. The operator enters the information on the cost of a rail car for the last similar exercise by a unit from that installation below the dashed line under "Per Car Cost." This entry allows the program to inform the operator of the estimated total cost. The figure is given below the dashed line under "Train Cost" in thousands of dollars (484.3 represents $484,300).

The spreadsheet depicted in the example was based on equipment available at Fort Carson, Colorado. Units that have different equipment may enter new rows of equipment and modify the calculations after studying the operator's manual for their specific program. They must be sure to insert new rows between the top and lowest rows in the top portion and copy formulas down into the blank cells of the spreadsheet where appropriate; this will be mostly in the second group of columns. Then, based on the length and weight of an item, the proper row is adjusted in the "Qty's" column of the lower portion to include the new row in its calculations.

(The computer I used consisted of an Apple II+ with a Smith-Corona TP-I, letter-quality printer. The software was MULTIPLAN by Microsoft. The entire assembly would cost about $1,600 today. I highly recommend, however, that a simple dot-matrix printer be selected instead of the slower letter-quality ones. The information and the template necessary to support this type of data processing has been turned over to the Command and Control Micro-computer Users Group (C²MUG) at Fort Leavenworth, Kansas. In this manner the information has been made available to any logistics officer who has a critical need to know how to plan to load a train without making it his life's work.)

The advantage of this system is primarily the time it saves. With it, a brigade logistics office can plan the train for an NTC rotation without the need for additional personnel. Another benefit of this system includes the rapid flow of vital information between units and the identification of necessary corrections. In addition, because the computer does all the mathematics, this eliminates most of the potential for mistakes. The "Adjustments" column will even provide a check of the data the operator listed under the units and will help identify where an erroneous entry may have been made.

The principal disadvantage of this system is that it requires a good computer, a good electronic spreadsheet program, and a good operator. But with the effort to modernize our troop units by allowing the procurement of computers, this may not be too difficult. If such a computer is not available at the brigade level, the unit's division headquarters will probably have one and probably a copy of a good electronic spreadsheet as well.

The implementation of this technique should let future logisticians save a great deal of time and reduce the burden on local installation transportation offices throughout the Army.

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SWAP SHOP

Here's how to fold a map to one-ninth its original size and use it without ever having to open it out to a larger size. Get a map, or preferably some practice paper, some glue or transparent tape, and a razor blade, and try it:

1. Lay the map face up on the table with north at the top.
2. Fold it in half (turn the bottom edge up to meet the top).
3. Crease the folded map into three equal parts with the creases parallel to the center fold.
4. Open the map completely and lay it face up in the normal position. Turn it so that east is at the top, and fold it in half as in Step 2 (fold the bottom to the top). Again, crease the folded map into three equal parts with the creases parallel to the center fold.
5. Open the map completely and lay it face up (with north in the normal position at the top). It is now creased into 36 equal parts (Figure 1). Using the razor blade, cut as indicated by the heavy north-south lines.
6. Next, position both hands in such a way that the fingers and thumb of each hand straddle the second crease from the top (Figure 2). Draw the paper up so it will fold at this crease and then fold over toward the top edge. Draw the paper up at the second crease from the bottom to meet the top edge, and fold bottom edge up to meet top. An "edge view" of the map should now look like three "V"s joined together (Figure 3).
7. Open the map to the center section (without unfolding the remainder, and turn it so that east is at the top. Straddle the second crease from the top as in Step 6. Draw the paper up and fold toward the top as before. Repeat the procedure with the second crease from the bottom, and fold the bottom edge up to meet the top, all as in the previous step. An "edge view" will again look like three "V"s together.
8. Allow the map to open at the middle V and lie flat on the table, exposing the center section without unfolding any other parts. Apply glue to the adjacent backs of the map where the cuts have been made, or bind the cut edges together with transparent tape. The sectors, so joined, can now be turned as one page.

You can now find any point by turning the flaps up and down, left and right. You can index the map for quicker reference by labeling the three sections of each lateral strip: A1, A2, and A3 (top); B1, B2, and B3 (center); and C1, C2, and C3 (bottom).

The map may be glued into a manila folder for protection and easier use, but it will have to be opened to two-ninths size to find all features and sections. Simply apply glue to the four bottom back corners and align the center crease of the map with that of the folder.

If you want to carry the map in a pocket-size notebook, fold it to one-thirty-sixth size and glue it to the notebook on one of the back corners. The map may be opened to one-ninth size for reading.

This method works with all maps, including those composed of sector sheets that have been glued together.

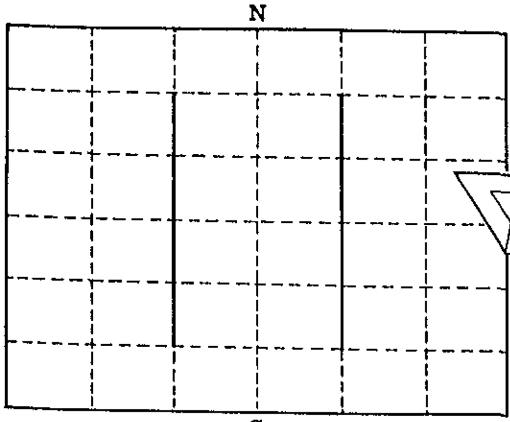

FIG 1

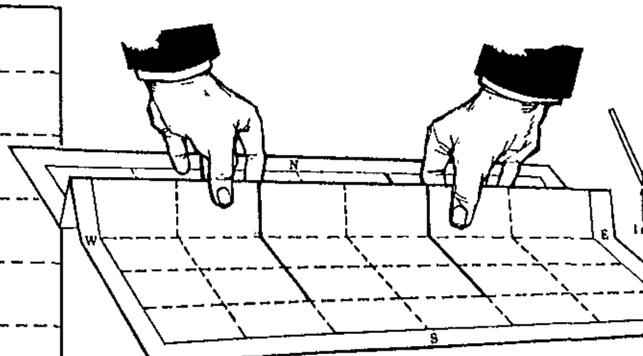

FIG 2

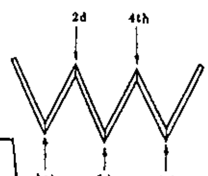

FIG 3

(Reprinted from the Infantry School Quarterly, *January 1956, pp. 29-31; prepared by Major James R. Darden, then an instructor in the Infantry School, who had learned the technique from a friend.)*