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FM 17-55

WAR DEPARTMENT

ARMORED FORCE FIELD MANUAL

TRAINS AND TRAINS HEADQUARTERS COMPANY ARMORED DIVISION

September 29, 1942

FM 17-55

ARMORED FORCE FIELD MANUAL

TRAINS AND TRAINS HEADQUARTERS COMPANY ARMORED DIVISION



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(For explanation of symbols see FM 21–6.)

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ARMORED FORCE FIELD MANUAL

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SECTION I

GENERAL

■ 1. SCOPE.—This manual covers the organization and tactical employment of the armored division trains as a whole. For tactical employment of the component parts of the division trains see FM 17–57, 17–58, and 17–80.

■ 2. DEFINITIONS.—*a. Division trains.*—The armored division trains are the service elements of the division and consist of trains headquarters and headquarters company, maintenance battalion, supply battalion, and medical battalion. The term "division trains" applies to those units listed above and any elements that may be attached, such as the division rear echelon and service company and unit trains.

b. Unit trains.—Unit trains are trains of the component units of the division. They are divided into echelon A and echelon B, composition of the echelons depending upon the supply and tactical situation.

(1) *Echelon A trains.*—These trains consist of the vehicles that accompany the unit and usually march at the rear of that unit. Normally they will consist of maintenance, essential fuel and lubricant, ammunition vehicles, and unit medical detachments. Equipment vehicles and kitchens may be part of this echelon.

(2) *Echelon B trains.*—These trains consist of vehicles of unit trains that normally march with higher unit trains. Unit personnel sections are in these trains. Some fuel and lubricants and ammunition vehicles may be in echelon B. Equipment vehicles, kitchen and ration trucks will usually join these trains after a unit moves from bivouac or assembly position to the attack.

■ 3. ORGANIZATION.—Figure 1 shows graphically the organization of armored division trains.

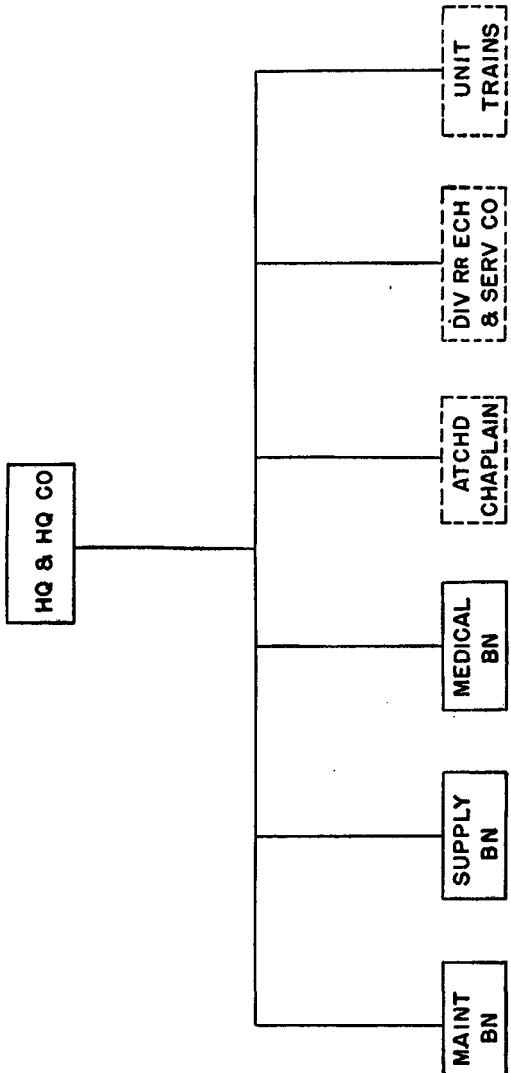


FIGURE 1.—Division trains.

■ 4. TRAINS HEADQUARTERS AND HEADQUARTERS COMPANY.—*a. Trains headquarters.*—Trains headquarters is organized for tactical operation of the trains. The train commander does not exercise administrative control over subordinate units except the headquarters company. The staff provides for two column commanders and operations and intelligence sections. (See fig. 2.)

b. Headquarters company.—The trains headquarters company is composed of a company headquarters, communication platoon, reconnaissance platoon, and tank command. (See fig. 3.)

(1) Company headquarters consists of a headquarters section, a maintenance section, and an administrative-supply-mess section. The maintenance section services the vehicles of headquarters company only. The administrative-supply-mess section contains mess equipment and personnel for the headquarters and headquarters company.

(2) The communication platoon has six medium power radio sets for attachment to the columns, to lower units, and for use of the train commander and staff officers as required.

(3) The reconnaissance platoon is used for route and bivouac reconnaissance primarily. It may be divided into two groups, one for each column commander.

(4) The tank command is organized to control tank platoons of maintenance companies of the armored regiments should any of these platoons be attached to the trains.

■ 5. DUTIES OF TRAIN COMMANDER.—*a. During training.*—During the time the division is training for combat, duties of the train commander are:

(1) Preparation of training programs for the division trains in accordance with division training directives.

(2) Approval of training schedules for component units of the division trains.

(3) Supervision of tactical training, including driving instruction, marksmanship, marches, bivouacs, security, and defensive combat, but excluding technical training pertinent only to a particular unit.

(4) Conduct of inspections and tests to determine fitness of units to perform tactical functions in the field.

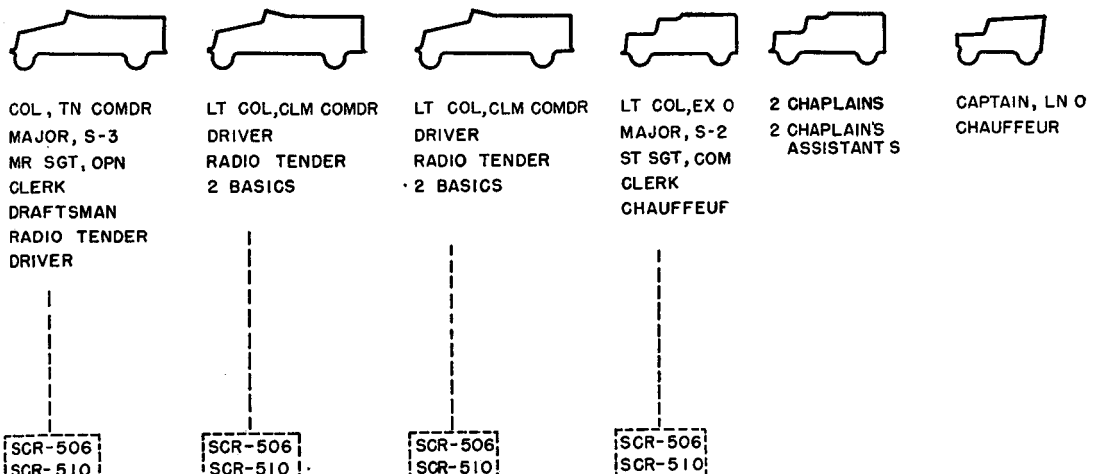


FIGURE 2.—Trains headquarters.

FIGURE 3.—Trains headquarters company.

(5) Preparation and conduct of command post and field exercises for the division trains. Unit trains should participate in some of these exercises.

b. In the field.—Duties of the train commander in the field are:

(1) Tactical command of the division trains. This does not include direction or execution of supply, maintenance, and evacuation functions.

(2) Security of the division trains (less detachments) and of attached unit trains to include defense of division installations within the bivouac area and such installations outside that area as the division commander may direct.

(3) Control and security of unit and division trains from the bivouac forward to the point of release to units.

(4) Movement of division trains as directed by the division commander.

(5) Selection of bivouacs when exact location is not designated by the division commander.

(6) Division of bivouac area into unit areas.

(7) Reconnaissance of routes for the division trains.

(8) Maintenance of close liaison with G–4, G–3, and G–2 with respect to tactical movements, dispositions, and security of trains.

(9) Maintenance of close liaison with the division provost marshal.

(10) At the CP, keeps a situation map, a map showing all supply installations, and the traffic circulation map.

(11) Calls upon the division commander for attachment of combat units when additional protection for the trains is necessary, and controls the actions of those units when so attached.

SECTION II

TRAINING

■ 6. GENERAL.—*a.* The subject of training generally is covered in FM 21–5. The train commander is responsible for the tactical but *not* the technical training of units composing the trains. (See par. 5.) The train commander conducts his tactical training to conform to division directives and the division administrative standing operating procedure. G–4

is responsible for preparation of this standing operating procedure, and in conjunction with G–3 prepares for approval of the division commander that part of division training directives pertaining to the trains. The train commander must keep in close touch with both G–3 and G–4 on training matters.

b. Tactical training of the division trains should stress marches and march discipline, use of cover and concealment in bivouac and at halts, security on the march, and security in bivouac. Units composing the trains and elements of unit trains that may be attached have individual weapons, machine guns, and antitank guns to be used in defense on the march and in bivouac. Frequent exercises must be held in order that a thoroughly coordinated defense may be established. Emphasis must be placed on night marches.

■ 7. TACTICAL EXERCISES.—*a.* During unit training phases the train commander, by directives, by supervision, and by inspection, assures himself that each unit is being properly trained in marches and security. He must inspect and make corrections as necessary. He uses his column commanders to assist in these inspections.

b. During unit training phases the train commander must be careful that he does not interfere with the technical training of units. He must balance purely tactical training against the needs for technical training. The primary functions of elements of the division trains are technical, therefore a preponderance of time must be spent on that training.

c. Frequent tactical exercises are held after conclusion of the company training phase. These exercises must simulate combat conditions as closely as practicable. Problems are drawn with a view to giving the maximum of instruction in marches and security. Do not initially try to cover all tactical operations in one problem. Emphasize one particular phase, later another phase, and finally execute a complete problem that covers all phases. Require units to carry out technical functions under combat conditions. Training should cover—

(1) Marches.

(2) Selection and occupation of bivouacs.

(3) Security on the march and in bivouac.

(4) Execution by units of normal activities in conjunction with the above training.

d. The following procedure is recommended:

(1) Select the particular phase of training to be emphasized.

(2) From the map select the area for the problem.

(3) Reconnoiter the area.

(4) Draft the problem and with the column commanders and staff play it on the map. Make changes as necessary.

(5) Issue the situation and warning order to the units.

(6) Make sure that units will have personnel and equipment as complete as possible.

(7) Move out from parks under simulated combat conditions.

(8) Execute the problem.

(9) Hold a critique.

e. A problem that is a mere road march or occupation of bivouac will become uninteresting and will contribute little to training. After the technique of marching, occupation of bivouacs, and security has been practiced, test units by having columns attacked by airplanes and by ground troops. Test security measures in bivouac. Test camouflage discipline by having aerial photographs made of bivouac areas. Examine these photographs for errors in camouflage and breaches of camouflage discipline. Bring errors to the attention not only of unit commanders but of the men by causing such photographs, properly marked to show errors, to be posted where men can see and examine them. Avoid ridicule in a critique. On the aerial photographs it is not necessary to name the unit at fault, as men will quickly find the location of their unit.

SECTION III

CONTROL, COMMUNICATION, LIAISON, AND ORDERS

■ 8. CONTROL.—*a.* Control of the trains presents a difficult and complex problem. Elements are being attached and detached constantly; columns move to railheads or supply points and then to units; medical and maintenance detachments are sent to support combat commands; and unit trains

are attached and detached. This causes a constant fluctuation in the strength and composition of the trains, and requires careful planning and careful records. The operations officer must keep a complete and detailed record of the units with trains showing number of vehicles, attachments, detachments, and locations. The train commander must know at all times the location of his units.

b. The train commander exercises control through his column commanders, unit commanders, and commander of attached trains. He uses his column commanders to command marching columns during an advance or withdrawal. These commanders may be used to control columns moving back to supply points or forward to combat units.

c. By giving explicit orders as to routes, phase lines, and rates of march, the commander controls the columns. He gives instruction to column or unit commanders orally, by radio, or by messenger. The use of radio may be restricted, therefore it is essential that definite plans be made and clear instructions issued.

■ 9. COMMUNICATION.—*a.* For communication the train commander has at his disposal motorcycle messengers and radio. The radio sets of the communication platoon are distributed as necessary by the train commander. Each column commander should have one of these sets when he is separated from the main body of the trains. One is used for communication by the train headquarters. S–2 should keep one set on the division reconnaissance net. One set should be on the air-warning net if such a net is established. Figure 4 shows the radio net for the trains.

b. The use of radio will be restricted. It must not be used in bivouac. When radio messages are to be sent from bivouac, place the radio set at least 5 miles from the area. Strict radio discipline must be maintained.

c. When voice radio is used, commanders habitually use it themselves. For restrictions on use of radio in the clear, see FM 24–5.

■ 10. LIAISON.—*a.* The train commander habitually keeps a liaison officer at the forward echelon of division headquarters. In addition he or one of his staff officers should visit

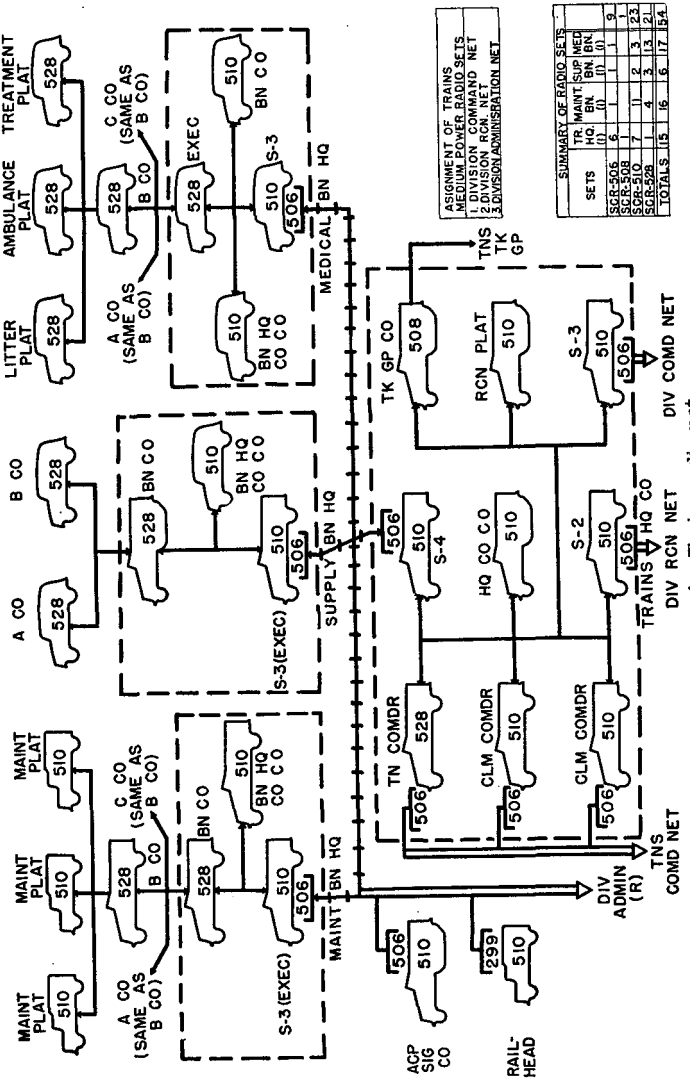


FIGURE 4.—Trains radio net.

the forward echelon of division headquarters at least once each day.

b. Lower units habitually maintain a liaison agent at the trains command post, both on the march and in bivouac. For qualifications of liaison officers, see FM 101–5.

■ 11. ORDERS.—*a.* The train commander normally receives his orders through G–4 and must therefore have close contact with that officer.

b. For form for orders see FM 101–5. The train commander's orders are usually oral and frequently fragmentary. They may be supplemented by overlays, marked maps, sketches, or marked aerial photographs.

c. The train commander must coordinate his tactical plan with the administrative plan of the division in order that the trains may be adequately protected and that the division may at the same time receive adequate logistical support.

SECTION IV

MAINTENANCE AND EVACUATION

■ 12. MAINTENANCE.—*a.* FM 17–50 covers generally maintenance and evacuation in units of the armored force. Each unit has its own maintenance sections for maintenance of its own vehicles. Attached trains usually will not have maintenance personnel accompanying them and it will be necessary for the maintenance battalion to take care of their maintenance needs.

b. The maintenance battalion performs third echelon maintenance for the trains. On the march, detachments of the maintenance battalion follow each column. The supply battalion furnishes its own maintenance personnel and equipment for its column. However, when large columns move back to railheads or other supply points and forward to combat units, detachments from the maintenance battalion should accompany them.

■ 13. EVACUATION.—For employment of the medical battalion see FM 17–80. Each unit has its own medical detachment. Medical needs of attached units not having attached medical personnel are a responsibility of the medical battalion. On

the march a detachment from the medical battalion follows each column.

SECTION V

RECONNAISSANCE

■ 14. MEANS.—The trains headquarters company has a small reconnaissance platoon (see par. 4*b*) that may be used for route and bivouac reconnaissance. It is not strong enough, however, for extensive reconnaissance missions. Available half-track vehicles, ¼-ton trucks, and motorcycles may be used to supplement the reconnaissance platoon. Observation airplanes warn the trains, when practicable, of the approach of any large body of hostile troops.

■ 15. ROUTE RECONNAISSANCE.—*a.* It is essential that the train commander know the condition of all routes from supply points to train bivouac and from train bivouac to combat units. Although G–4 is responsible for traffic circulation, and such circulation in the rear areas is controlled by the provost marshal, the train commander must secure accurate information on routes.

b. Reconnaissance information of routes from the bivouac to the forward areas is received from the forward echelon of division headquarters. *It is the duty of the train liaison officer to secure this information and transmit it, preferably by marked map, to the train commander.* The train commander makes such additional reconnaissance as is necessary and causes column commanders, unit commanders, and the reconnaissance platoon to make reconnaissance. Column commanders and others who will have to take convoys over routes at night will, if practicable, reconnoiter the road during the day. Particularly, distances will be measured by odometer and landmarks noted. (See fig. 5.) The train commander should have a complete record of odometer readings on all routes the trains may use.

SECTION VI

MARCHES, BIVOUACS, SECURITY

■ 16. MARCHES.—Marches are conducted according to the fundamentals and methods prescribed in FM 17–50 and

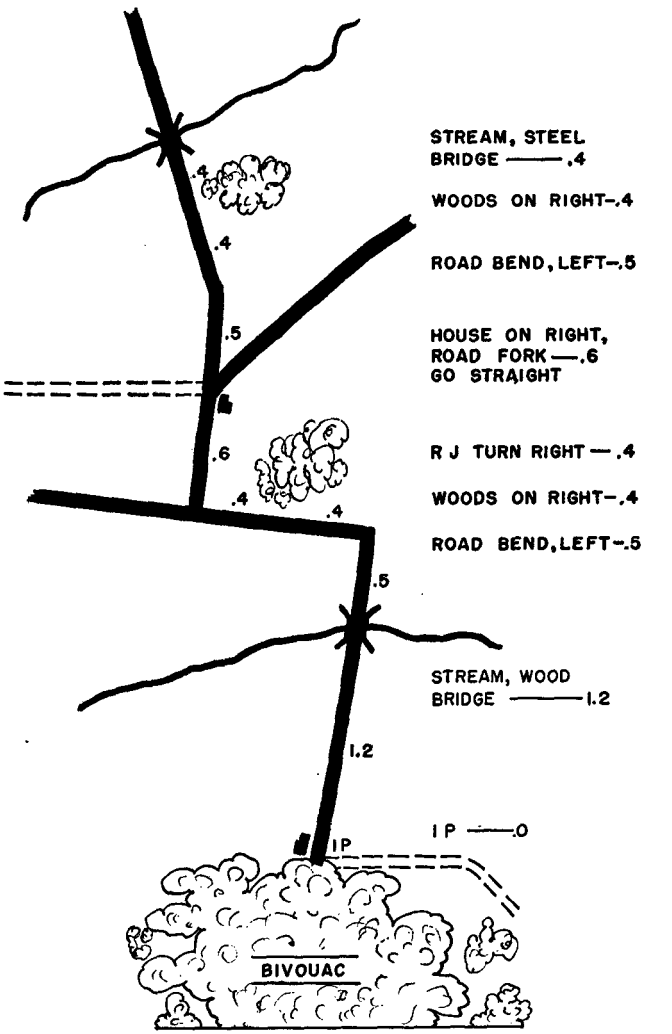


FIGURE 5.—Route reconnaissance. (Note odometer reading of landmarks.)

25–10. Much of the marching will be at night; the order of march frequently changes; the composition of columns varies; units are constantly being attached or detached. Each unit must therefore develop march technique to a high degree of perfection. March discipline must be strict.

a. Formations.—(1) The division trains, depending upon the road net and traffic circulation as prescribed by G–4, will march in two or more columns. Each column is divided into march units of 20 to 25 vehicles, unit organization being preserved as far as practicable. Each column details advance, flank, and rear guards. (See par. 18.)

(2) Attached unit trains of each combat command are grouped together and are placed in the column that follows their parent organization. Organic units of the train are so placed in column as best to facilitate their entry into bivouac and the performance of their service functions. Figure 6 shows a two-column formation for division trains, and figure 7 shows a three-column formation.

b. Routes.—(1) *Control.*—Traffic control in rear areas must be strict, particularly when the number of good roads is small. For this reason the division commander normally prescribes routes for the division trains. Movement on these routes must be closely coordinated to prevent interference with supply and evacuation functions.

(2) *Selection.*—In selecting routes the following must be considered:

(*a*) Condition of road.

(*b*) Capacity.

(*c*) Strength and clearance of bridges; clearance of underpasses.

(*d*) Length of route.

(*e*) Security. Is it near a flank and subject to interruption? Are there defiles? Can vehicles move off the road and disperse?

(*f*) Suitability for night movement.

(*g*) Weather.

(3) *Condition.*—Tanks, half-track vehicles, and heavy trucks will seriously damage dirt roads. Bridges may be broken, and swampy or muddy stretches made impassable. The effect of the passage of combat units must, therefore, be

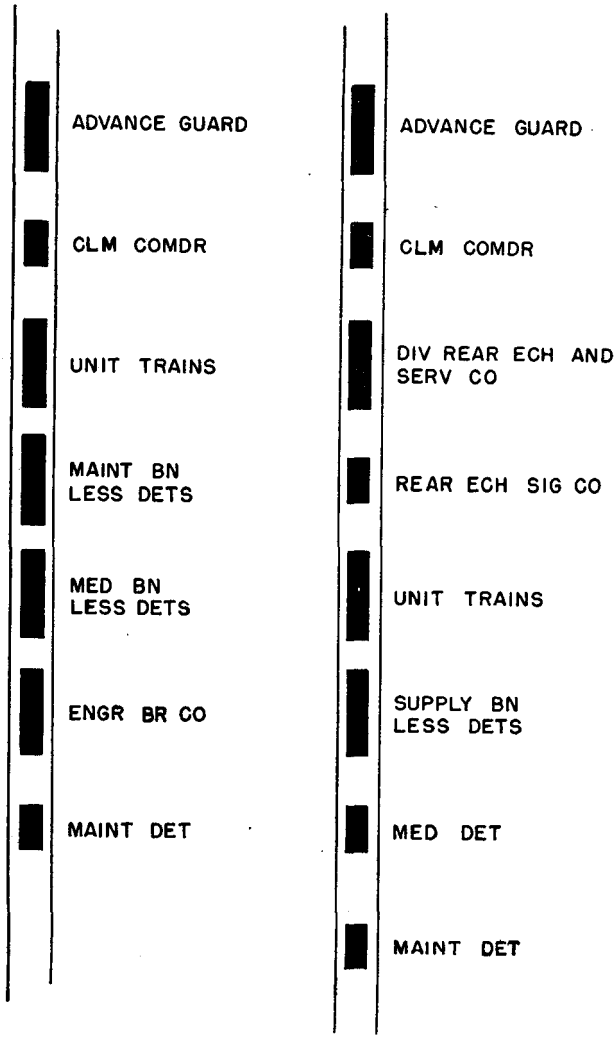


FIGURE 6.—Two-column formation for division trains.

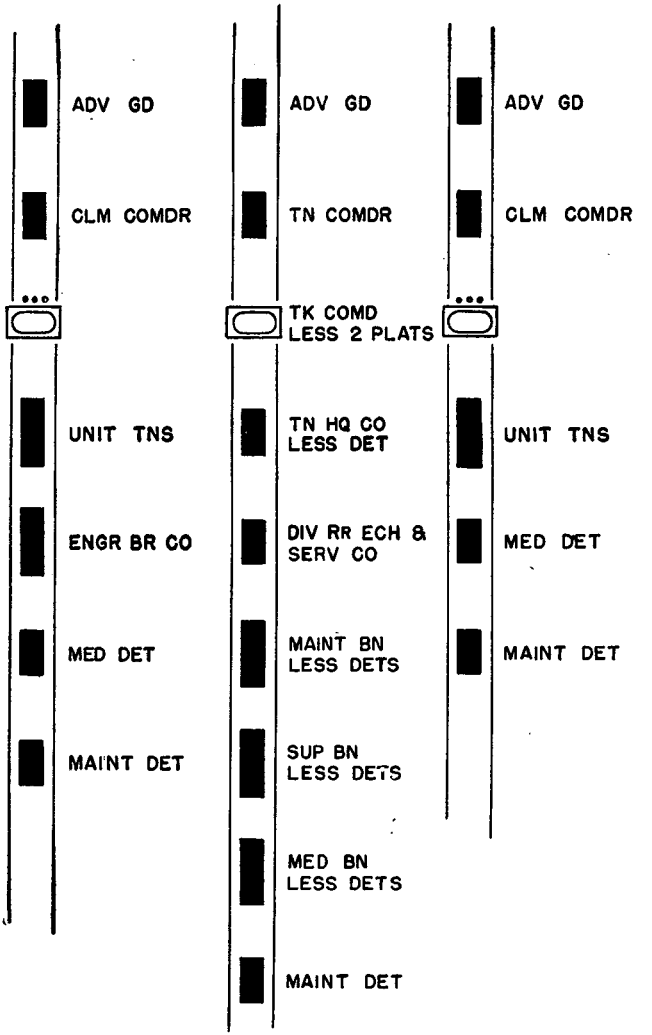


FIGURE 7.—Three-column formation for division trains.

considered by the division commander, and the best of the dirt roads selected if hard surface roads are not available.

(4) *Capacity.*—Consider whether the road is one-lane or two-lane. Many country roads will be one-lane, and stalled vehicles may delay or block a column.

(5) *Strength and clearance of bridges.*—Know the weight and height of vehicles in the column. The capacity of all bridges must be determined. This information is obtained by the engineers and relayed to the train commander by the liaison officer at the forward echelon of the division command post. Although the division engineers are responsible for strengthening bridges, it is the duty of the train commander to assure himself that this is done. He must leave nothing to chance. Check clearance of underpasses and bridges with overhead structure. *Do not take the chance of being blocked because a vehicle will not clear. Send such vehicles in another column.*

(6) *Length.*—The route should be as short as practicable consistent with security and condition of the road. A good long route may be shorter in *time* than a bad route which is shorter in miles. Movements, particularly on dark nights, require short routes, as speed will be reduced to 10 miles or less per hour when moving without lights.

(7) *Security.*—When there is a choice of routes, trains should move as far as practicable from the exposed flank. Defiles, such as passes, bridges, and stretches of road with steep embankment, are dangerous for a column because of air attack and are avoided if practicable. If they must be traversed, special precautions must be taken. Narrow roads with overhanging trees afford maximum concealment. Such roads are particularly favorable for protection against air attack if vehicles are able to move off the road. Such roads are unfavorable for night movement because of poor visibility.

(8) *Night movement.*—A road with well-defined edges and free from steep embankments is preferable for night movement. Concrete roads are best because the light texture of the road materially aids the driver's vision. Black-top roads, particularly on rainy nights, are hard to follow.

(9) *Weather.*—Rain may make dirt roads impassable and black-top roads slippery. It impairs vision so much that the

rate of march will be lowered appreciably except on good concrete roads in open country.

c. Preparation for the march.—(1) In preparing for the march the following must be done:

(*a*) Issue warning orders.

(*b*) Select routes if they have not been prescribed.

(*c*) Get all available data on the routes. Make additional reconnaissance as necessary. Arrange for improvement of routes where needed.

(*d*) Measure routes.

(*e*) Select phase lines.

(*f*) Contact provost marshal to find out where military police will be posted. Arrange for other guides as necessary.

(*g*) Have new bivouac reconnoitered if practicable. Arrange for billeting parties.

(*h*) After considering composition of the combat commands and the division reserve, assign units to columns and routes.

(*i*) Select IP's and time for head of column to pass.

(*j*) Make final plans and issue orders preferably showing routes, composition of columns, IP, time heads of columns pass IP, phase lines, and new bivouac, on an overlay or marked map.

(2) Much of the detail for marches and march technique may be contained in standing operating procedure. Units not normally attached to the division trains will not know the standing operating procedure, and orders to them must be given in detail.

d. Control.—March control is obtained by designation of routes, rates of march, and phase lines. Radio may be used for control at times, but radio will often be silent. Motor messengers or liaison airplanes must then be used. Although radio is silent, receivers must be turned on to receive emergency messages such as air attack warnings.

e. Night marches.—Night marches will be normal for the trains. For technique of night marches see FM 17–50 and 25–10.

f. Rate of march.—The rate of march depends upon the rate of the slowest vehicle, medium tanks, time of day, condition of roads, and the weather. In a column containing

medium tanks the rate will not ordinarily exceed 17 miles per hour. When no medium tanks are present, a higher rate may be maintained.

■ 17. BIVOUACS.—*a. General.*—(1) The general area for bivouacs is designated by the division commander. The train commander reconnoiters this area and divides it into unit areas.

(2) In the advance the trains bivouac will be close behind the division reserve, a distance of not more than 10 miles depending upon the road net and condition of roads. This is necessary both for protection and for rapid delivery of supplies to the division.

(3) In the defense the trains bivouac may be as much as 35 miles behind the combat units, depending on condition of the roads. It must be close enough so the unit trains may make a round trip between their units and the train bivouac under cover of darkness.

(4) In retrograde movements, trains are moved rapidly to the rear and bivouac at such points as do not interfere with rearward movement of combat units.

b. Characteristics.—The following characteristics should be sought in selecting bivouac areas:

(1) Concealment from air observation.

(2) Ample space for parking vehicles at least 50 yards apart.

(3) Protection from mechanized attack by natural obstacles such as swamps, mountains, dense woods, stumpy or rocky ground.

(4) Numerous exits, so units will not be blocked and prevented from moving from the bivouac either by an enemy force or by destruction of bridges.

(5) Good all-weather standings for vehicles.

(6) Good fields of fire for defense weapons.

c. Allotment of areas.—(1) In the allotment of bivouac areas, consideration must be given to the size of the unit, its function, cover within the area, and its means of defense. The size of units, because of attachments and detachments, will vary greatly. The size of unit trains attached to the division trains will vary between wide limits. In order to allot areas properly the trains commander must keep an accurate

account of attachments and detachments and must plan for units joining or leaving the bivouac.

(2) The following considerations govern the location of units in bivouac:

(*a*) The division rear echelon and service company should be located so that it will receive protection from other units.

(*b*) The train command post should be near the division rear echelon.

(*c*) The medical battalion, having no weapons for protection, should be located so as to be protected by other units. It should have good access to roads and be near the roads used for evacuation.

(*d*) The maintenance battalion must be located so that it can set up its maintenance facilities without undue delay and also be near the roads used for evacuation of vehicles. A town having shop facilities should be used whenever possible.

(*e*) The supply battalion will have trucks moving in and out at frequent intervals. It must be close to the main roads or have good access to roads.

(*f*) Unit trains will vary in size and must be located so they can move to their respective units without confusion. These trains are grouped so that those of a particular combat command and those of the division reserve are together.

(*g*) The rear echelon of the signal company should be near the division rear echelon.

(*h*) The engineer bridge company, if attached, may be located anywhere it will have access to good roads.

(3) Minimum bivouac areas, allowing 50 yards between vehicles, are as follows:

Unit	Area in yards
Trains headquarters and headquarters company	200 x 200
Division rear echelon and service company (rear echelon signal company attached)	350 x 350
Maintenance battalion	700 x 800
Headquarters and headquarters company	300 x 300
Maintenance company	250 x 300
Medical battalion	450 x 500
Headquarters and headquarters company	200 x 200
Medical company	250 x 250

Unit	Area in yards
Supply battalion	750 x 750
Headquarters and headquarters company	200 x 250
Truck company	450 x 500
Total trains	1,300 x 1,300
Engineer bridge company	300 x 300
Unit trains	Variable

(4) Each unit furnishes a billeting party to accompany a representative of the trains commander to the new bivouac area. This representative assigns the areas to units in accordance with the desires of the trains commander. Each unit then subdivides its area as necessary and posts guides to lead units to their positions.

d. Movement into bivouac.—(1) Good planning and clear, definite orders will do much to prevent closing of columns and halting at bivouac entrances. Arrange to move units into bivouac so that columns will not be crossed. Assignment of bivouac areas from front to rear in order of march will tend to prevent confusion. Make sure guides are posted and that each unit guide has a marker with him that can be easily distinguished at some distance. At night the use of luminous markers will aid considerably.

(2) During the training period, emphasis should be placed upon orderly movement into bivouac.

e. Movement out of bivouac.—(1) Form column by having individual vehicles move into their places in the column and keep moving. Do not let vehicles move onto the road and halt.

(2) Set a time for the head of each unit to reach the IP. Each unit commander must determine the distance from his bivouac to the IP. He leaves his bivouac so as to reach the IP at the proper time. He must not halt at the IP but must reach it and pass it at the proper time while traveling at the prescribed rate. Reaching the IP early will cause the column to halt and will probably result in vehicles closing up. Reaching the IP late not only results in losing contact with the preceding unit but causes all following units to be late. It may cause following units to halt on the road.

(3) If interior roads of the bivouac are to be used by more than one unit, the trains commander must specify the priority of movement.

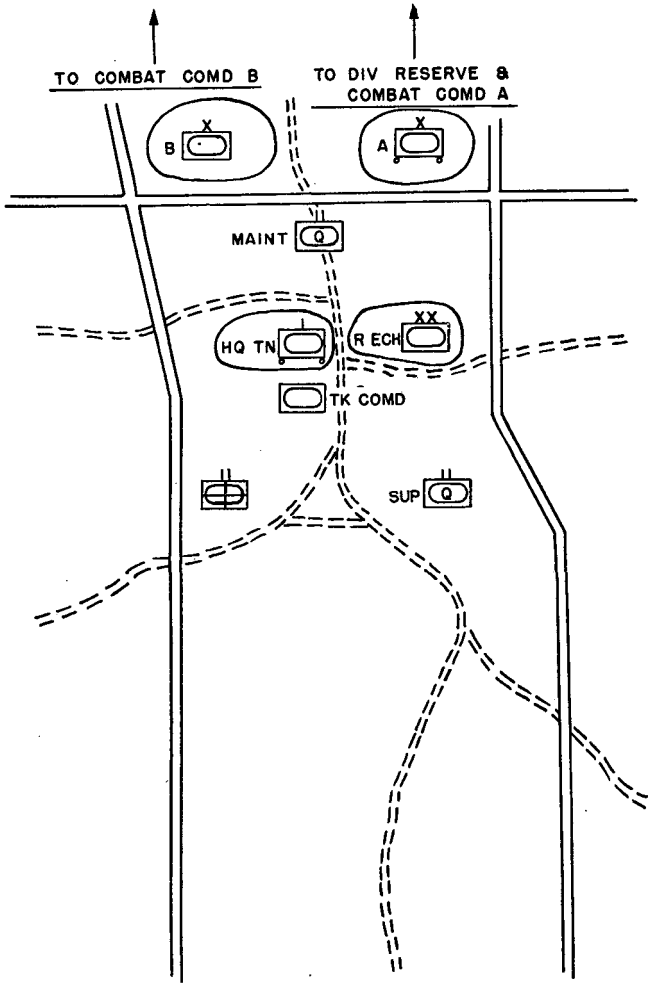


FIGURE 8.—Division trains bivouac.



FIGURE 9.—Do not form column on road and halt.

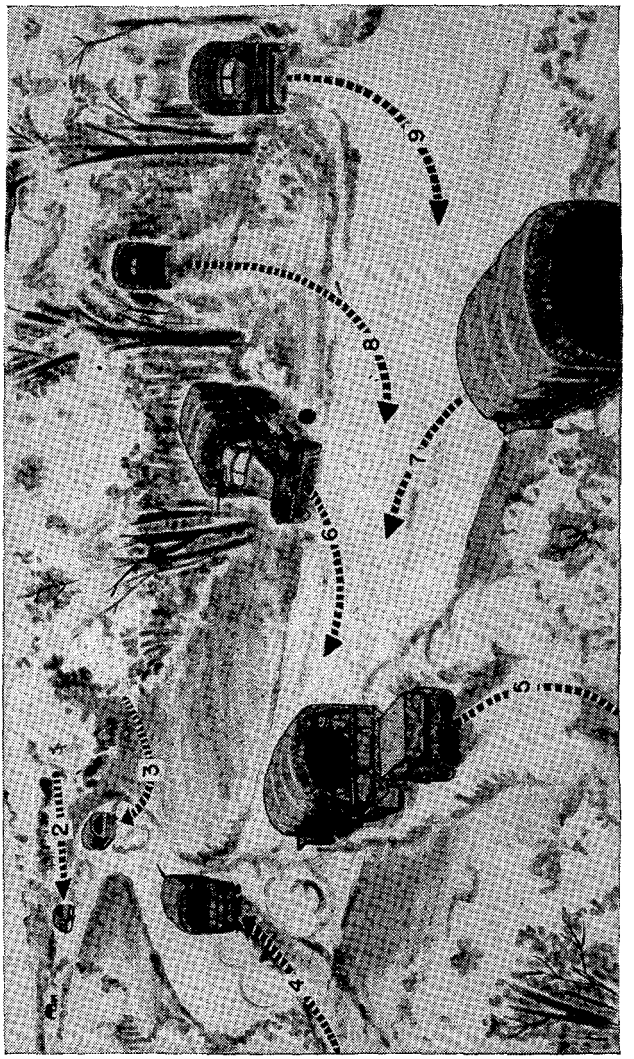


FIGURE 10.—Form column marching.

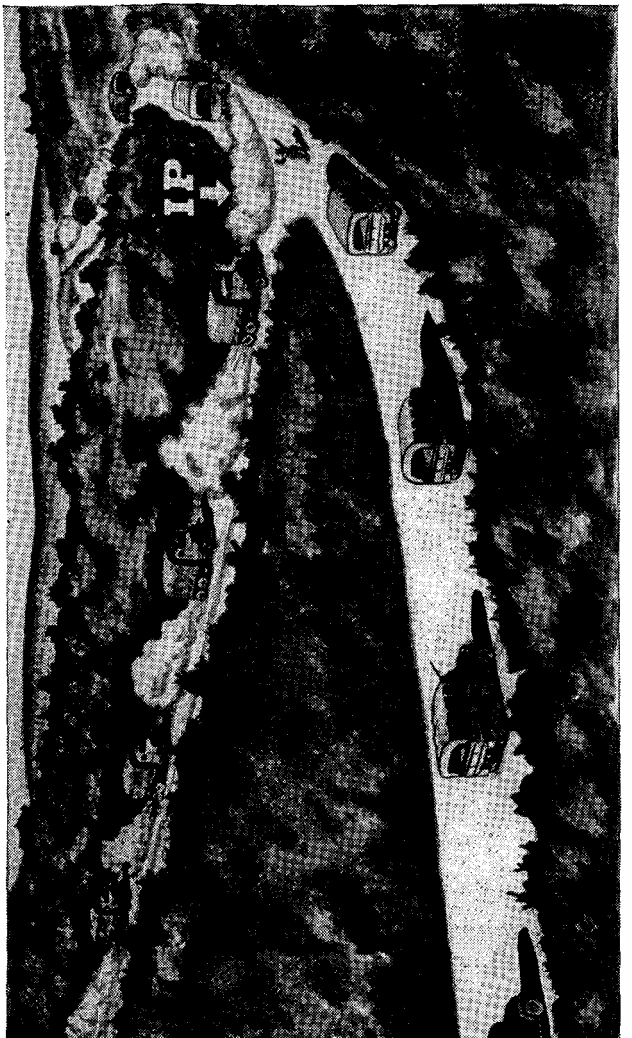


FIGURE 11.—Do not reach IP too early. This column had to halt.

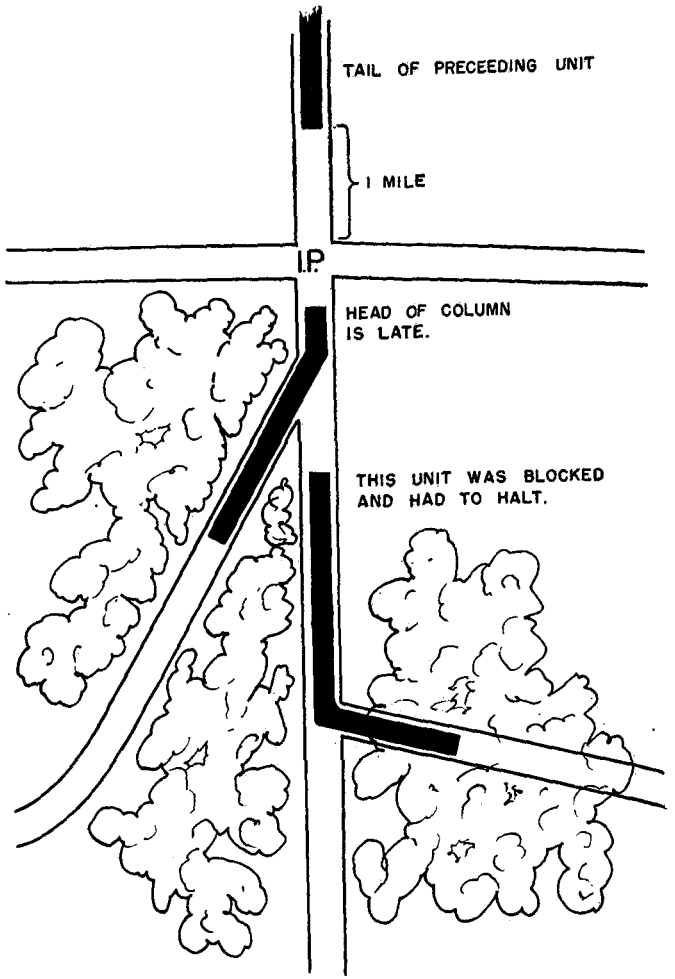


FIGURE 12.—Do not reach IP too late. Contact will be lost and other units may be blocked.

■ 18. SECURITY.—The subject of security generally is discussed in FM 100–5. This paragraph covers security both on the march and in bivouac. All commanders are responsible for the security of their units. The train commander is responsible for the security of the division trains, including attached units, both on the march and in bivouac, while these units are under his control. Each subordinate unit is responsible for its own local security, but the security of the trains as a whole cannot be delegated to a lower unit.

a. Means.—(1) Each unit of the division trains, except the medical battalion, is provided with individual arms, machine guns that may be used against either ground troops or aircraft, and towed or self-propelled 37-mm antitank guns. In addition, the train commander has a tank command which is organized to control replacement tanks of maintenance companies of the armored regiments, 16 medium and 8 light. He will rarely have all these tanks.

(2) Should additional protection be necessary, the train commander must call upon the division commander for attachment of combat troops.

(3) Often antiaircraft units will be attached to the division trains. Employment of these troops is covered in FM 4–105.

(4) Means of security will vary because of the constant change in attachment and detachment of troops. Any plan for security must, therefore, be extremely flexible.

b. On the march.—(1) *Against ground attack.*—(*a*) Although the trains march behind the combat troops and receive some protection from these troops, each column must provide for front, flank, and rear protection. Some protection is gained from adjacent troops and by marching on routes away from the exposed flank.

(*b*) Danger to the marching column from ground attack comes from small enemy groups infiltrating through or passed over by the combat troops, and from attacks from the flanks. Small isolated groups are overcome by the column commanders. To counter large parties the train commander must use his reserve of tanks and whatever other troops he may have at his disposal.

(*c*) The train commander must keep constantly informed of the situation by maintaining contact with the division com-

mand post, both through the liaison officer and by direct radio contact. In addition, air reconnaissance with the division should be directed to report any movements of the enemy that will endanger the trains.

(*d*) The division provost marshal, through the network of traffic control posts, can furnish some warning of enemy approach. The trains commander should take advantage of this service.

(*e*) The reconnaissance platoon, although small, is capable of patrolling to the front or flank and is used for this purpose.

(*f*) When the replacement tanks are attached to the trains, a platoon of four tanks, usually light tanks, is attached to each column. The remainder is kept in reserve, placed to repel an attack quickly.

(*g*) Column commanders form advance guards of available vehicles and personnel. Self-propelled antitank guns and half-track vehicles should be used for this purpose. A small flank guard will be detailed if necessary. Some motorcycles or ¼-ton trucks should be sent out to flanks. Contact is maintained with adjacent columns.

(*h*) Towed or self-propelled antitank guns in the column are kept ready to repel attacks.

(2) *Against air attack.*—Trains are particularly vulnerable to air attacks. Security from air attack is obtained by—

(*a*) Keeping at least 80 yards between vehicles.

(*b*) Keeping all weapons prepared for instant use against low-flying aircraft. During the march, keep woods and hills covered with these weapons so as to be ready to open fire instantly.

(*c*) Contact with the air warning service and prompt transmittal of air warnings.

(*d*) Use of cover at halts, or dispersal of vehicles if cover is not available. Slit trenches are dug at long halts.

(*e*) Use of attached antiaircraft elements to cover defiles.

c. In bivouac.—(1) *Against ground attack.*—(*a*) Against ground attack security in bivouac is obtained by—

1. Use of natural and artificial obstacles.

2. Establishment of an outpost.

(*b*) Select bivouacs that will give maximum protection from ground attack, especially mechanized attack. Erect artificial

obstacles as necessary. Use antitank mines and protect them with antitank guns.

(*c*) Use available personnel to establish an outpost. An outpost will usually be established by giving each unit a sector to cover, and by using the tank command as a reserve.

(*d*) If available, use attached infantry elements for outpost duty.

(2) *Against air attack.*—(*a*) In bivouac, security against air attack is obtained primarily by concealment. Check camouflage measures. Brush out vehicle tracks. Enforce strict discipline.

(*b*) Keep some vehicular weapons manned but do not fire unless attacked.

(*c*) Attached antiaircraft units should be located to give all around protection if practicable.

(*d*) Keep at least one man on the alert at each CP down to and including platoons. All men must keep individual weapons instantly available. Paratroops may attack.

