

CHAPTER III

MOVEMENT OF TROOPS

Section 1. Movement by Strategical Train.

VON MOLTKE in 1866 was the first person to make use of railways on the grand scale for troop movement in war, and by their means he concentrated the Prussian Army in twenty-five days for the war against Austria. The use of railways for troop movement during the Great War was very considerable, and, as a result of the experience then gained, it has been found possible to standardize the system to a large extent.

In so far as the British Expeditionary Force was concerned, the two most important railway moves carried out in France were: firstly, the move of six divisions and one cavalry division from the Aisne to the Lys in October, 1914, a distance of 120 miles, in eleven days; and, secondly, the move of five divisions from France to Italy in November, 1917, a distance of seven hundred miles in eleven days.

For purposes of illustration the move of the 3rd German Reserve Division from Angerburg to Allenstein in August, 1914, may also be quoted. This division was in action in the Benkheim area on the morning of August 21st, it marched distances of from thirteen to twenty miles to the entraining stations, travelled seventy-nine miles by rail and was detrained complete by the night of the 23rd, the railway move taking forty-eight hours. This represents a very quick move. The point to notice in connection with these moves is that the actual time spent on the rail journey is small in comparison with the time taken to entrain and detrain. Although many hundreds of individuals can entrain in

London in the morning, attend the Grand National nearly two hundred miles away in the afternoon and return by rail to London the same night, it is quite another matter to entrain a large body of troops with their horses, vehicles and impedimenta of all kinds.

So we find that, when forces of the size of a division or more have to be moved, it is quicker to move by road than by rail, if the distance is less than sixty miles in the case of a division, or ninety miles in the case of a cavalry division. Beyond these distances the advantage lies with the railway move. There remains the alternative, for moves of comparatively short distances, of using a combination of rail and road movement, dismounted personnel going by train, mounted personnel and transport by road; or, again, motor transport can be used for moving the dismounted personnel. Provided the formation moving is not very large—that is to say, a division or less—this combination of methods is the quickest way of moving for distances involving a march of less than three days, though there are certain drawbacks in its use, which will be dealt with in a later section.

Thus we have three methods of troop movement, which will now be considered—

- (i) When units move complete by train with their animals and transport. This is known as movement by *Strategical Train*.
- (ii) When the dismounted personnel of units move by rail with a minimum of their transport, the remainder going by march route. This is called movement by *Tactical Train*.
- (iii) When the dismounted personnel moves by road in buses or lorries, and the remainder marches. This we will call movement by *Mechanical Transport*.

When a division is moving by strategical train, the mechanical transport of the division will move by road or by rail, according to the distance which has to

be covered. Thus for a move from France to Italy the M.T. went by road, but for a trans-continental move it might be better to send the M.T. by rail also.

Rate of Movement by Rail.

It has been pointed out above that a division can move sixty miles, that is three long marches, as quickly by road as by rail. That is to say, it takes nearly three days to move a division sixty miles by rail. It would only take four days to move it six hundred miles by rail. Within limits, then, it is not the distance which is the deciding factor. Why does it take so long to carry out the move of, say, a division by rail?

One reason is to be found in the time taken to entrain and detrain, another lies in the limited number of trains that can be run over a given stretch of line in a stated period of time.

As regards the first of these reasons, different railway stations vary considerably in the facilities they provide for the entrainment and detrainment of troops; again, they vary in their facilities for shunting and marshalling the trains. Before a second train can be placed in position for loading or unloading, the previous train must be hauled clear of the sidings; the yards also must be cleared of one lot of troops and their belongings before they can be used by another train load, for congestion in the railway premises and in the approaches to them must not be allowed to occur, or delay is inevitable. When allowance has been made for these considerations, it has been found in practice that three hours is required for entrainment or detrainment from standard troop trains. It follows, therefore, that a maximum of eight troop trains can be dealt with in twenty-four hours at any one entraining or detraining point.

It may be possible to find more than one entraining point in the same railway station, if it is a very large and well-equipped place; but in order to avoid congestion, and for the greater convenience of the troops

with regard to billeting accommodation, it will generally be preferable to select entraining and detraining places a few miles apart. Besides, it is always advisable not to put too many eggs in one basket; an accident may cause delays, or blocking of one entraining point, and there is also the possibility of hostile air attack to be borne in mind. So, if we assume three points for entraining and three for detraining, it will be seen that not more than twenty-four troop trains can be dealt with in twenty-four hours. More than three entraining points can, of course, be used if desired, but in view of other considerations, which will now be explained, it is open to question whether any appreciable advantage will be gained thereby.

As regards the second reason for the length of time required to carry out the movement of troops by rail, every railway system has its maximum rate or density of movement—*i.e.*, the maximum number of trains it is possible to run over the system both ways in a period of twenty-four hours. The figure depends on a number of considerations, mainly of a technical nature; for example, it depends on whether the line is single or double, on the length of the block sections, on the amount of rolling stock and engine power available, on the gradients, marshalling and shunting facilities, etc. On some British railways a maximum density of 144 trains in twenty-four hours has been maintained for troop movement, but this has meant the entire suspension for the time being of all other railway traffic. During operations in war time the troops who are still in action during the period of a troop movement by rail have got to be maintained as usual. It may or may not be possible to suspend entirely all civil traffic, and for either strategical or tactical reasons certain lines may not be available.

Taking all these factors into consideration, it has been found in practice that, even on highly developed continental railway systems, the maximum rate for the strategic move of any individual formation, such as a

division, can be accepted as twenty-four troop trains of the continental type in twenty-four hours. On a single line the rate of movement, for technical railway reasons, is very much less and may not exceed eight trains in twenty-four hours.

Uniformity of running speed is essential, and in practice may be taken as from seventeen to twenty miles an hour. On the above basis the time necessary to carry out the strategic move of a force by rail over a given distance can be calculated; and it will be found that the number of hours required is approximately determined by the number of trains, plus entraining time (three hours), plus detraining time (three hours), plus running time for the journey. It takes in or about forty trains of the continental type to move a division. If we apply the above formula to the move of the five British divisions from France to Italy in 1917, we get $5 \times 40 + 3 + 3 + \frac{700}{17} = 248$ hours, or ten days and eight hours.

The actual movement was completed within eleven days. It will now be clear that under normal conditions we can expect to run twenty-four continental type troop trains over a stretch of double line between any two points in twenty-four hours, and this rate of movement can be met by the use of three entraining and three detraining points; an increase in the number of the latter is not likely to speed up the movement as a whole.

As regards the method of moving troops by rail, there are two distinct systems—the British and the continental.

In the British system the composition of the train is adjusted in conformity with the type of unit to be moved.

In the continental system a standard type of train of fixed composition is used for all units, with the exception of tank units, heavy artillery, or units equipped entirely with mechanical transport requiring special types of trucks.

The whole experience of the war was in favour of standardization and the adoption of the continental system, and even in this country the number of type trains used for troop movement was finally reduced to five.

In a war of any magnitude outside the United Kingdom it is practically certain that the continental system, with its one standard type of train, will invariably be used in future. The actual composition of the standard type train may have to vary somewhat to fit the particular nature of the theatre of war, engine power, gauge, ruling gradients, and so on; but the type finally adopted in France, to the exclusion of all others, was a train of fifty vehicles—called the omnibus type—and it had—

- 1 coach (first or second class) for officers (30 officers).
 - 30 covered vans, each taking 40 men or 8 horses (6 H.D.).
 - 17 flat trucks averaging four axles per truck. (Three axles in the case of four-wheeled vehicles, four in the case of two-wheeled or limbered vehicles).
 - 2 brake vans for railway personnel only.
- Total vehicles 50.

A train of this composition will carry a battalion of infantry, less one rifle company, a regiment of cavalry, or a battery of artillery complete with personnel, animals, guns and vehicles. And thirty-five to forty trains of this type are required to move a division, while seventy to one hundred and eighty are required on the British system.

The standard type trains adopted in England were much smaller, being made up to carry such parts of units as half a battery of artillery, a squadron of cavalry, half a battalion of infantry and such like. The average running speed of the English trains was twenty-five miles an hour, while in France it was seventeen miles an hour.

The relative advantages and disadvantages of the two systems may be summarized as follows :—

The continental system admits of a number of trains, the carrying capacity of which is a known factor, being held ready in garage ; a move can, in consequence, be initiated and completed in a minimum time and with a minimum of preliminary notice, and the time necessary for making the move can be exactly calculated. This, of course, is of great value in military operations, and increases the possibility of effecting strategic surprise. It may be argued that this could also be done in connection with the British system, but in this case the trains are not interchangeable, being made up to suit the requirements of certain units only. The British system also requires a large amount of passenger coaches, which are difficult to come by in sufficient quantity, and the time taken to assemble and marshal the train is considerably longer. The British system has the advantage of not breaking up units, and it ensures greater comfort for the troops, but it results in serious loss of carrying capacity in the railway system as a whole. In the continental system of fixed type train, to ensure the maximum use of carrying capacity, the breaking up of some units is unavoidable, and the comfort of the troops is distinctly less.

On the whole, the advantages of the continental system—interchangeability, economy in marshalling time and running capacity, the known number of trains required for any formation that it may be desired to move, the facilities for effecting surprise—far outweigh the disadvantages, and it is probably the only practical method of working when large forces are involved.

Procedure for Strategic Rail Moves.

The orders for a strategic move by rail will be initiated from G.H.Q. and issued by the General Staff in consultation with the Movements branch of the Q.M.G.'s staff. Similarly, in the lower formations the executive

order for the move will be issued by the General Staff, the detailed arrangements being made by the Q.M.G.'s branch. The orders issued by the General Staff would include a warning order if necessary, the executive order for the move, the arrangements for A.A. defence during movement, and any orders required for tactical movements on detrainment. Based on these orders, the Q.M.G.'s branch of the Staff of the formation concerned works out the detailed arrangements for allotting units to trains, and issues all instructions required in connection with the entrainment, detrainment, and procedure during the move. An officer of the G.H.Q. Movement Staff will normally be detailed to supervise the arrangements; he will be the medium of communication between the troops and the railway authorities. His duties will also include ensuring that the necessary facilities are provided by the railway authorities by way of ramps for entraining vehicles and animals, and for bridging the space between trucks when end loading is being used. He will see that the necessary arrangements are made *en route* for any halts required for watering or feeding. He is responsible for notifying all concerned of the dispatch and anticipated arrivals of the various troop trains. He arranges, when necessary, for any special lighting required at entraining and detraining points. It is his duty to ensure that the most effective military use is made of the railway, and that the technical working of the railway is not hampered by the troops. The troops themselves are responsible for the actual loading and unloading of animals, vehicles and stores. This work, however, is very much facilitated, if experienced working parties can be made available to assist.

We have now seen how a move of the nature we are considering is initiated, and the division of responsibility for carrying it out. The next point to consider is the detailed organization and the administrative instructions that are necessary. In this connection the first requirements are—

(b) Specimen Form of Serial Number Table.

TABLE OF SERIAL NUMBERS.
1 Div.

Serial No.	Description of Unit.
DIVISIONAL TROOPS.	
101	H.Q. 1 Div.
102	1 Div. Sigs. (less 146 to 153, 156, 160, 176).
103	H.Q. R.E., 1 Div.
104	Fd. Park Coy. R.E.
105	1 Fd. Coy. R.E., less 106.
106	4 L.G.S. Wagons and teams 1 Fd. Coy. R.E.
107	2 Fd. Coy. R.E.
108	3 Fd. Coy. R.E., less 109.
109	4 L.G.S. Wagons and teams, 3 Fd. Coy. R.E.
Etc.	Etc.

(c) Specimen Form of Time Table.

TIME TABLE RAIL MOVEMENT.

1 Div.

From Entraining Stations.

A. NUNEATON.
B. COVENTRY.
C. SHUNTOKE.

To Detraining Stations.

X. ANDOVER.
Y. WHITCHURCH.
Z. FULLERTON.

Detraining Regulating Station : MARLBOROUGH.

Train Nos. from Stations.	Serial No. of Unit.			Day	Route.	Time of Departure.	Train due to arrive at Station.			Day Oct.
	A.	B.	C.				X.	Y.	Z.	
1		157	...	28	BRIMINGHAM	0100	0700			28
2		167	...	28		0200		0800		28
3		119, 121, 155, 156, 158	...	28		0300			0900	28
4		160, 162, 164	...	28		0400	1000			28
5		165, 166, 168, 170, 172, 174	...	28		0500		1100		28
6		120, 122, 148	...	28		0600			1200	28
7		159	...	28		0700	1300			28
8		169	...	28		0800		1400		28
		Etc.								

The actual compilation of the Serial Number Table is the most troublesome part. Taking an infantry brigade as an example, it will be found that each battalion, less one rifle company, requires a train. Therefore

give each battalion a serial number and each rifle company a serial number. Then the brigade headquarters and the brigade signal section will each require a number. Thus we have ten serial numbers for this small formation, and they can be fitted into five trains, four taking the battalions, less four rifle companies, the remainder going in the fifth train. A unit like a *reserve H.T. Company R.A.S.C. is more difficult to arrange, on account of the large number of axles involved. The seventeen flat trucks of the standard train will only take sixty-eight axles, or thirty-four limbered G.S. wagons, so this number with their attendant men and animals is given a serial number. This leaves twenty-four L.G.S. wagons to be disposed of; it will be found best to divide these into two small batches, as more convenient for fitting in with other small units to make up complete train loads. In this way three serial numbers would be allotted to this unit. The problem really is to find a happy mean which will avoid splitting up units more than necessary, while at the same time making the fullest possible use of the carrying capacity of the trains.

Mechanical transport will normally move by road except for very long journeys. If the length of the train journey exceeds two marches for the M.T. by road, the problem of supply at the destination end may necessitate sending some or all of the second line transport by rail with the troops it serves, unless special arrangements for the maintenance of supply can be made in advance.

As regards the orders that will be required for the troops moving, in addition to copies of the Serial Number Table and the Time Table described above, instructions will be required on a number of other points, of which the following is a summary :—

- (a) Date, time, place of entraining.
- (b) Times of departure of trains, hour at which troops are to be at entraining point

* This unit is to be abolished.

(transport three hours before train leaves, remainder of personnel not required for loading one hour before train leaves).

- (e) Route to entraining point, place of assembly and latrine arrangements.
- (d) Destination, duration of journey, route, halts *en route*. (Unless kept secret.)
- (e) Detail of officers in charge of entraining and detraining and how to travel.
- (f) Advance parties, and billeting parties—strength, rations, bicycles, trains on which to travel.
- (g) Detail of loading and unloading parties, from units or a permanent detail. Orderlies and fatigue men at stations.
- (h) Accommodation in detrainment area and action on detrainment.
- (i) Supply arrangements.
- (j) Medical and sanitary arrangements.
- (k) Mechanical transport—command, grouping, route, staging areas, supply.
- (l) Use of lights at night.

In order to maintain secrecy, or to meet changes in the situation arising during the course of a move, it is almost always advisable, especially in the case of a movement over a considerable distance, to select a detrainment regulating station, to which all trains are sent in the first instance and from which they can be sent on to the required detraining point; in the case of short moves the rearmost detraining station may serve the purpose.

A.A. defence during railway movements is a matter of considerable importance. Not only may protection be required at entraining and detraining points, but trains in movement, in certain circumstances, offer favourable targets for attack from the air. Available statistics show that about one in three attacks by low-flying planes on unprotected trains was successful; in future, presumably, the danger will be greater, and

arrangements will be required to deal with the possibility. There does not appear to be any great difficulty in mounting light automatics on flat trucks to deal with low-flying aeroplanes, and all units therefore now have the necessary resources at their disposal.

Section 2. Movement by Tactical Train.

In the previous section the general principles governing all troop movements by rail have been considered, and their application in the case of movement by strategical trains explained. Occasions may arise, however, when the movements are tactical rather than strategical, as, for example, when it is desired rapidly to reinforce a threatened area, or when it is advisable to hold tactical reserves farther from the actual battle line, and thus make them more readily available over a wider extent of front.

Other opportunities when railways can help troops in tactical movement occur when roads are very congested with traffic, when troops are very tired, when billeting areas are not available close at hand, or in very bad weather; on such occasions the use of railways to move troops may be of very great assistance. Yet another type of case arises in the event of civil disturbance whether in peace or war. In railway movements of this nature only the personnel of dismounted units travels by rail with an absolute minimum of transport; the bulk of the transport and all mounted troops travel by road.

It will be seen, therefore, that there are certain limitations to the usefulness of this type of movement, the chief of which are as follows :—

- (a) It is not applicable to the movement of large bodies of troops. In the past moves of this nature have been confined to one or at the most two divisions, and more often to a single infantry brigade, or even to individual battalions.

- (b) Formations on detraining are separated from their artillery and from a large portion of their first-line transport.
- (c) The distance of the move is limited to about forty miles on account of this separation from unit transport.
- (d) The maintenance problem is somewhat complicated during the progress of the move.
- (e) In order to make the most of the carrying capacity of the available railway transport some splitting up of units is unavoidable.
- (f) The utility of the system depends entirely on the geographical situation of the railway line, and the entraining and detraining points available.
- (g) Finally, we must not lose sight of the fact that troops in movement by rail are very vulnerable to attack from the air.

From the above it will be seen that movement by tactical train has definite uses and limitations. Its employment will probably be more frequent during periods of comparative stabilization, though it is by no means impossible during mobile operations, and it may be of great value in effecting surprise concentrations. Moves of this nature have very little effect on the pace of movement of large formations. For purposes of big concentrations for battle, if railways are to be employed, movement by strategical train must be resorted to. Tactical train moves are very well suited to the movement of tank units and also in cases of internal disorder, as in the latter case artillery is rarely if ever required, while second-line transport, and to a large extent first-line also, can usually be dispensed with, large quantities of ammunition are not required and the war-time maintenance system is probably not in force.

In order to obtain full benefit from the use of tactical trains, it is essential that arrangements should admit of

a movement by this means being carried out at the shortest possible notice. This will necessitate holding in permanent commission trains of suitable carrying capacity, garaged in convenient centres. In war, however, there is generally a shortage of the rolling stock required to meet all our army's needs. The amount that can be set on one side, and held ready for possible use in this way, must therefore be decided by the highest authority in possession of a full knowledge of all the relevant factors.

As in the case of movement by strategical train, standardization of procedure is the surest method of getting the maximum of efficiency. The standard railway organization for tactical train moves consists in the use of trains in sets of four, three being standard personnel trains, and one a standard omnibus train of the strategical type described in the previous section. A set of four trains of this nature is designed to carry the dismounted personnel of an infantry brigade, brigade signal section, field company R.E., and one company of a field ambulance, with a minimum of transport.

The normal composition of the personnel type train was :—

- 2 (1st or 2nd class) coaches carrying from 24 to 30 officers each.
- 44 (3rd class) coaches carrying 40 men each.
- 2 covered trucks, for stores, bicycles or personnel.
- 2 brake vans for railway personnel only.

—
Total 50 vehicles.

The composition of the omnibus type train is given in the previous section. In some cases the sets of trains consisted of two personnel and two omnibus type.

The detailed loading of the trains will depend on circumstances, for, if units are moving into action, they would naturally take with them by rail the maximum number of fighting vehicles, such as machine-gun, Lewis-gun, and S.A.A. limbers; while, if coming out

of action, travelling kitchens and water carts might take precedence over vehicles more essential for tactical purposes.

The staff of the formation moving will, of course, issue orders as to what is to be taken by rail and what sent with the road party. The best way to work out the allotment of troops to trains is to start with the omnibus type trains; in them the maximum number of axles that can be carried is determined by the number of flat trucks available. These axles must be accompanied in the same train by the corresponding number of animals and drivers, the remaining capacity of all the trains is then filled with dismounted personnel. Care is, of course, required to ensure that adequate personnel is sent with the road parties to perform the necessary duties *en route*, whether tactical or administrative.

The move of the road party is organized like an ordinary march and, if the distance is over twenty miles, a halt for the night must be allowed for. The supply arrangements with mechanical transport present little difficulty so long as supply officers concerned are kept fully and punctually informed of the number of men and animals accompanying each party.

A suggested form in which to show the allotment of troops to a set of tactical trains is given below. As pointed out previously the detailed loading, especially as regards vehicles, will depend on circumstances.

As regards entrainment and detrainment it is sufficient to allow one hour in the case of personnel trains, but three hours are necessary in the case of omnibus trains carrying vehicles and animals.

The number of points used for entrainment and detrainment will depend on the size of the force moving, the rate at which it is desired to carry out the move, the capacity of the line and its geographical position in relation to the areas to and from which the troops are moving. Personnel trains can, if necessary, be loaded and unloaded on an open line, but it is a first

principle of railway work that no loading or unloading takes place on a through working line. The omnibus type trains will require the normal facilities; that is, a total siding accommodation of five hundred yards, with shunting facilities in addition; room for at least three flat trucks at a platform, or end loading ramp; room for at least three horse trucks alongside a platform, or failing platforms, three portable horse ramps.

Points to be dealt with in Orders.

Orders for this type of move are similar to those required in the case of movement by strategical train, but they can, as a rule, be shorter. The following is a summary of the points which will normally require to be dealt with:—

- (a) Orders for the move, destination, and probable time of arrival.
- (b) Role on arrival, and transport and equipment to be taken by rail.
- (c) Air defence arrangements.
- (d) Number and composition of trains allotted, and detail of troops to trains.
- (e) Road party—command, time of start, starting point, route, staging areas, A.A. defence.
- (f) Maintenance arrangements, ammunition, supplies, baggage, greatcoats, cooking facilities.
- (g) Medical and sanitary arrangements.

Section 3. Movement of Troops by Mechanical Transport.

In considering the question of movement of troops by mechanical transport it should be clearly understood that this form of movement is akin to movement by rail. It is similar, in fact, in many respects to movement by tactical train. It is not to be confused with the employment on the field of battle of mechanized forces. A completely mechanized force may conceivably be employed as such in tactical movements in contact with the enemy, but an infantry brigade moving in buses or lorries is little more capable of tactical evolution

SUGGESTED FORM FOR SHOWING ALLOTMENT OF TROOPS TO A SET OF TACTICAL TRAINS

Serial No.	Train Type and Number.	Place from.	Time of Start.	Unit of Troop.	Officers.	Other Ranks.	Mules.	Animals.			Vehicles.	Place to.	Time of Arrival.	Remarks.
								Horses.	(a)	(b)				
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)
1	T.O.1			H.Q. 1 Bde. Sigs. 1 Bde. "A" Bn. "B" Bn. "C" Bn. "D" Bn. 1 Ed. Coy. 1 Ed. Amb.	4 1 1 1 1 1 4 2	12 27 50 50 50 50 100 40	1 6 1 1 1 1 1 1	5 7 19 7 19 7 19 2	3 2 6 6 6 6 2 2	1 L.G.S. wagon 1 L.G.S. wagon 4 L.G.S. Lewis guns 1 L.G.S. M.C.A. 1 L.G.S. M.C.A. 1 L.G.S. M.C.A. 1 Maltese cart 1 L.G.S. wagon 1 L.G.S. wagon			Formation moving. 1 Inf. Bde. complete. 1 Inf. Bde. Sig. Sec. 1 Coy. P.Fd. Amb. 1 Coy. P.Fd. Amb.	
Total in T.O. Train													15 379 13 46 84 26 68 axles	
2	T.P.2			H.Q. 1 Bde. Sigs. 1 Bde. "A" Bn. 1 Ed. Coy.	4 1 7 1	25 0 737 100	8 0 11 16							
Total in T.P.2													38 869 35	
3	T.P.3			"B" Bn. "D" Bn.	32 16	737 368	11 5							
4	T.P.4			"C" Bn. "D" Bn.	32 16	737 369	11 6							

The balance of this brigade group would form the road party.

than it would be if moving in railway trucks. It is from this point of view that this form of troop movement will now be considered.

Movement by mechanical transport was considerably developed during the Great War. Both the French and the Germans moved infantry in lorries in support of their cavalry in the early stages. London buses were sent to Antwerp with the Marines in October, 1914. During the defence of Verdun in 1916 the French used 2,500 lorries to transport an average of 13,000 men and nearly 2,000 tons of stores daily over a distance of eighty-five miles each day, and they maintained their rate of movement with little diminution for a month. This last example was a case of intensive road traffic run on lines closely resembling a system of railway traffic control.

The large area of a modern battle-field makes the existence of a reserve which can be moved rapidly, and without the fatigue entailed by long marches, of prime importance. For such duties as the seizure and consolidation of important points on a line of advance, for wide enveloping movements, and in rearguard work, the value of moving infantry in buses may be very considerable. The combination of two of the first principles of war—surprise and mobility—rendered possible by the use of mechanical transport for troop movement, is a most valuable weapon in the initial stages of an attack, in following up a success, or in a withdrawal. Rapidity of manœuvre is the essence of surprise, and the possibility of moving troops rapidly by mechanical transport must enter into our calculations when making plans of operations.

Before discussing the detailed organization required for this form of movement, it will be well to examine briefly the main tactical considerations which affect the question.

Firstly, there is the fact that few things are more visible, or more liable to attack, by air forces than long columns of lorries, or troops engaged in the processes

of embusing or debusing. The remedies in this particular are to be found in anti-air defences and in the use of movement by night.

Secondly, there is the question of relative pace of movement. With infantry equipped as at present, with horse-drawn first line transport, a movement by mechanical transport over any appreciable distance involves a separation of units from their first line vehicles, and therefore from part of their essential fighting requirements. In this case the remedy lies in equipping infantry units with mechanized first line transport capable of accompanying them on the line of march, and of maintaining, when necessary, the same speed as the infantry themselves when moving in buses and lorries.

Thirdly, there is the question of maintenance of communication. The greater the pace of movement, the greater the distances that can be covered, and the greater in consequence the difficulties of communication between the various parts of a force. The indiscriminate use of wireless for communication purposes might easily discount the surprise we are hoping to gain by increased mobility. The solution here may lie in expansion of the motor cycle dispatch rider service, and possibly in the use of aeroplanes to assist intercommunication.

Finally, a point which will have to be decided is the distance from the anticipated field of battle at which it will be necessary for troops, who fight on foot, but are carried in M.T., to leave the latter; and, further, what is to become of the M.T. vehicles during an operation. The object to be aimed at in considering this last question is to ensure that the troops are not fired on when still in the lorries. Also, unless the nature of the country or the time of year offer good facilities for concealment, the lorries after unloading may have to be withdrawn several miles to avoid drawing the attention of hostile aircraft. In this case the infantry must fight without thinking too much of their farther movement by means of the lorry column.

In searching for the solution of the various problems of a tactical nature which affect the question of troop movement by M.T., the greatest difficulty which has so far presented itself, with our present-day infantry organization, is the question of how troops moved by bus can be maintained and fed without their unit transport on arrival at their destination, and how far their tactical efficiency is impaired by the lack of the vehicles which carry their Lewis and Vickers guns.

The use of movement by night has been referred to above. Though the advantage of concealment may be obtained thereby, it must be realized that the pace of movement of large lorry columns during darkness cannot be great. Allowing for essential halts, the pace of movement by day can be taken as an average of eight miles an hour, but at night it would be unwise to count on an average pace of movement in excess of six miles an hour. Quite small columns or individual units can, of course, exceed this rate of movement considerably, but large columns cannot. Much will depend on the roads, and the widest and best roads available should always be allotted for M.T. movements. It should be remembered that driving lorries in big convoys is extremely tiring for the drivers, especially when moving at night.

Organization of Bus Units.

Bus units are not maintained in our army as such in time of peace, but they can be organized in war time in accordance with requirements. A mere collection of lorries, without the organization indicated below, is unworkable as a means of troop movement. The essential points governing the organization required are as follows :—

- (i) Bus units should contain a suitable number of vehicles to enable them to carry a definite unit or formation, such as an infantry battalion or brigade.

- (ii) They should be of a convenient size for command, control and administration.
- (iii) They require adequate establishments of officers, motor cyclists, workshops, store, baggage and supply lorries of their own, and spare lorries.

If continuous working is required under war conditions, it must be remembered that the wastage is very high and may easily amount to a third of the vehicles being off the road at any one time undergoing repair and overhaul. At least $2\frac{1}{2}$ per cent. of the vehicles actually allotted for the carriage of troops should be earmarked as "running spares."

During the Great War the organization employed was in auxiliary omnibus parks R.A.S.C., consisting of a headquarters, a headquarter company, and six bus companies. Their equipment was partly bus and partly lorry. This formation could transport the dismounted personnel of one division, two bus companies being capable of carrying an infantry brigade and a field company R.E.

Embusing, Debusing and Halting Points.

An important consideration in the movement of troops by mechanical transport is the selection of suitable places for embusing, debusing and for halts *en route*. Whenever possible, sites for these should be carefully reconnoitred in advance. Ideal requirements from the M.T. point of view would be a long, straight stretch of broad road, with room at the side for troops to form up. Such a site would, however, form a perfect target for attack from the air, and would probably have to be avoided in consequence, and a less suitable site selected for the sake of concealment from observation. For forming up the vehicles the space required for one hundred lorries is 1,200 yards, or a hundred buses 1,400 yards. While running, a minimum distance of 25 yards a vehicle is necessary.

In addition to the site for forming up the vehicles, assembly places are also required for the troops; these must be clear of the actual roadway. The vicinity of villages or defiles of any sort should naturally be avoided when selecting embusing points. About fifteen to twenty minutes should be allowed for actually forming up the lorries and buses from column of route, and another fifteen minutes are required for embusing the troops. Speed in this is largely a matter of good drill and discipline; with practice the time taken can be very much reduced, and as many as 3,500 men have been embused in six minutes.

During a movement by M.T. halts are required. These are necessary to enable columns to close up, for rectifying minor engine troubles, and sometimes to enable the engines to cool. On long journeys they are necessary to rest the personnel. The frequency of these halts will depend largely on the nature of the road; they are particularly necessary during a move by night, when it may be advisable to have them at intervals of about six miles. Whenever possible halting points should be previously reconnoitred, concealment from air observation should be looked for, and halts should not be on steep hills.

The Bus Route and Control of Movement.

Naturally the route to be used for M.T. movement should be carefully selected, if possible by actual ground reconnaissance. The route should then be piqueted to prevent the possibility of mistakes, as overrunning a turning may entail very serious delay. Motor cyclists are the best for this purpose, and they require a light at night so that lorry drivers can see their signals. If sufficient motor cyclists are not available for piqueting, it may be necessary to send one or two lorry loads of troops in advance of the main column for the purpose, arrangements being made to pick them up again after the rear of the column has passed. It has been found of great advantage, when running over

unknown roads, to give the actual lorry drivers previous instruction in the accidents of the road they are about to traverse.

The question of turning circuits at the end of a journey is one of very great importance. On really good wide roads it is of course possible to turn lorries in the road, and with good drill it can be done in reasonable time; but there are very few roads that will admit of this being done, and in any case a turning circuit is infinitely preferable. In tactical moves by M.T. this point should be very carefully considered, halting places and bounds being selected in view of the use of cross roads for securing a return route for lorries should it be necessary. Neglect of this precaution may easily result in serious losses.

Within the essential demands of tactics, bus routes should be worked as far as possible like a railway system—embusing, debusing, halting and turning places being fixed like the stations on a railway line. For sustained movement over a given stretch of road, this is almost a necessity.

In the actual control of the moving bus column there are two aspects of the question to consider. Firstly, the tactical command; and secondly, the technical mechanical control.

When the movement is for tactical purposes the O.C. troops must always command the column, irrespective of seniority. He will be the deciding authority on all questions such as direction of column, alteration of route, regulation of halts, dousing of headlights, everything, in fact, except the actual mechanical side.

When the movement is not a tactical one, but is merely a quick transport of troops behind the line from one billeting area to another, the mechanical convoy acts like a ferry; the movement is in charge of the senior R.A.S.C. officer, and the duties of the O.C. troops are similar to those of the commander of a troop train.

When the move is a tactical one, steps should be taken to ensure that the R.A.S.C. officers with the bus column are thoroughly conversant with the tactical situation.

The essence of success in carrying out a large scale movement by mechanical transport is co-operation. The staff of the formation to be moved must consult the senior M.T. officer before the move takes place, so as to ensure that all possibility of misunderstandings is eliminated; there must be the closest co-operation between the staff, the troops, and the bus authorities throughout the movement, and there must be good bus discipline in the troops themselves, if success is to be ensured.

The division of responsibility cannot be fixed on any hard and fast lines, as it must vary somewhat with the particular tactical conditions of each case. The general outline of the procedure will normally be somewhat as follows :—

The higher authority ordering the move will fix the embusing points, the time of start, route to be followed, halting places and, possibly, duration of halts, the time of clearing particular points, the final destination, and the anti-air protection of the route.

The O.C. Bus Park will be responsible for getting the buses to the embusing points at the time ordered, for following the route laid down, for running to time, and for the subsequent disposal of the vehicles after arrival at the destination.

The formation moving will be responsible for getting the troops to the embusing point in time—*i.e.*, fifteen minutes before the convoy is ordered to start—for clearing the road to enable the buses to form up (this takes about twenty minutes), for making the actual embusing and debusing arrangements, for clearing the road at the end of the journey for the bus column to move off, for detailing advance parties and guides to precede the main column, and, in conjunction with the O.C. bus unit, for piqueting the route where necessary to prevent mistakes.

It is only by carefully attending to a large number of small points and by training that rapidity and success can be obtained in carrying out M.T. moves on a large

scale. Orders and instructions must, therefore, be very detailed. A summary of the points that will usually require attention is given as an appendix to this section.

As regards the actual procedure for embusing troops, there are two methods which may be used. The first is to embus, say, two battalions of a brigade at a time. The second is to treat the embusing point like the platform of a railway station capable of entraining, say, one unit at a time, then, as each unit moves off in its section of the convoy, another should take its place. Unless the question of concealment from air observation necessitates the use of several embusing points, the latter method is generally the best. Troops to be embused should always be paraded on the running side of the road, unless the route can be closed entirely to all other traffic. On approaching the debusing point, the head of the column should be checked some four hundred yards short, and drivers warned to pull into the side of the road selected for debusing. Unless this precaution is taken, it will be found that on halting the long column of buses the road will be blocked for the passage of other vehicles and troops.

The Road Party.—The similarity between movement of troops by M.T. and movement by tactical train has already been referred to. In the former case, however, the whole of the transport of units must march. Until such time as first-line transport of infantry units is mechanized, this necessitates the separation of units from their vehicles for the period of the march, and consequently limits the useful length of a M.T. move to approximately forty miles, or two days' march for the road party. If this distance is exceeded the difficulties of supply and maintenance become serious, and the tactical efficiency of the unit is also much impaired by the lack of its essential vehicles. If other circumstances admit, it is best to start the road party the day before the bus move, so that it can rejoin its own units on the evening of the M.T. movement, assuming that movement to have been made by day.

The whole aspect of this problem will be changed, if and when infantry units are equipped with first-line mechanized transport, capable of accompanying the fighting troops when moving in lorries. The radius of action of infantry forces will then be very considerably increased.

APPENDIX TO SECTION 3.

POINTS FOR CONSIDERATION FOR ORDERS AND INSTRUCTIONS FOR BUS MOVES.

Suggested form for bus movement table attached.

<i>Points.</i>	<i>Remarks.</i>
1. Warning Order.	Almost always essential for bus moves, as formation moving must co-operate in advance with M.T. officers.
2. Order for move, destination, date and time, route.	
3. Role on arrival at destination.	Unless secrecy precludes this.
4. Air protection.	Air patrols (R.A.F.; A.A. defence units; Lewis guns in convoy; what to do in event of air attack.
5. Advance parties (tactical).	
6. Embusing and Debusing points.	Description; marking of; signalling arrangements at; officers superintending. Should be reconnoitred in advance unless quite impossible to arrange.
7. Halting points.	Place; approximate time; duration of halt; any special orders regarding re-embusing at.
8. Sub-division of formations into unit group; O's.C. Groups and duties. Allotment of vehicles to groups and flagging of first and last vehicle of groups.	<i>Vide</i> F.S.R. Details under 8, 9 and 10 arranged in consultation with M.T. officer. First and last vehicles of each group flagged.
9. Numbering of buses and of parties for each to correspond.	Buses numbered in each group from front to rear. Full number of men detailed for each bus and parties numbered to correspond with bus numbers.

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| 10. Allotment of embusing points to groups, and flagging. | |
| 11. Detail of spare vehicles. | These are marked "Not to be loaded." |
| 12. Detail of baggage lorries. | Separate lorries for baggage; always move these in separate column. |
| 13. March table to embusing point. | |
| 14. Time and place of assembly for embusing. | 10 parties for 10 lorries, 120 yards.
10 parties for 10 buses, 140 yards. |
| 15. Embusing and debusing. | Signal for—who gives the order. |
| 16. Equipment. | Worn during move or otherwise.
Disposal of rifles, Lewis guns, etc. |
| 17. Road piqueting parties. Advance parties (Admin.). Guides for billeting areas. | How carried, who commands, when to start. |
| 18. Clearing road at debusing point. | Road must be kept clear of troops till buses have got clear at destination point. |
| 19. March to destination after debusing. | |
| 20. Supply arrangements. | Road party and bus party. |
| 21. Position of bus commander. | |
| 22. Road party. | Composition; commander; route halting place; time of start. |

Suggested form for bus movement table, attached.

