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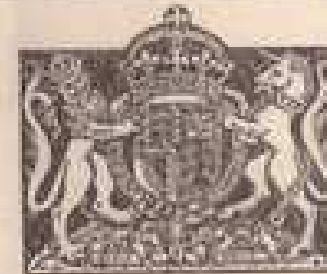
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Book**

Pamphlet No. 6

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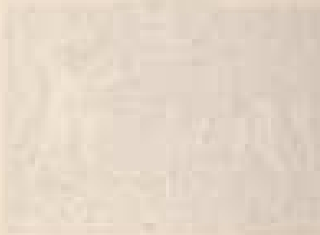
MECHANIZED MOVEMENT BY ROAD

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By Command of the Army Council,

H. Greedy

THE WAR OFFICE,
4th October, 1939.

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FIELD SERVICE POCKET BOOK PAMPHLET No. 6, 1939

MECHANIZED MOVEMENT BY ROAD

1. Factors affecting movement

1. *Definitions.*—(i) *Speed.*—Speed means the average speed over a route including the time spent on halts. It is expressed in terms of "miles in the hour" (m.i.h.).

(ii) *Cruising Speed.*—The speedometer speed at which a vehicle must travel over open sections of road to maintain a given average speed (i.e. m.i.h.) is known as "cruising speed." It is expressed in "miles per hour" (m.p.h.). Appendix I gives the maximum cruising speeds of service vehicles under good average conditions.

(iii) *Density.*—The general spacing of vehicles on a route is known as "density" and is expressed in terms "vehicles to the mile" (v.t.m.).

(iv) *Group.*—A group is a small number of vehicles moving as a formed group.

(v) *Sector.*—For purposes of road movement control a route may be divided up into "sectors," each sector being about 10 miles to 15 miles long.

2. Density and cruising speed are inter-related, since the higher the speed the lower must be the density, to allow the individual vehicle to be driven without interference or danger from those in front. The maximum safe density for a given cruising speed can be found from Appendix II.

3. As a column enters a *restricted section* a gradual reduction in speed takes place and the density is correspondingly increased. As this increase also serves to prevent an undue opening out of the column when vehicles accelerate on clearing the restriction, the volume of traffic using the road will be reduced over and above the delay imposed on individual vehicles, unless the increase

in density is in proportion to the decrease in speed. The proportionate increase necessary can be found from the formulae given in Appendix III; whilst Appendix IV shows the number of vehicles that will pass a point at various speeds and densities.

4. In deciding, therefore, on the "speed" and "density" at which a move is to be made, it will be advisable first to ascertain the "cruising speed" of the slowest vehicles in the column and to estimate from a study of the map the average "speed" that can be expected. Before a density at the maximum allowed in Appendix II is ordered, the length of the various restricted sectors and the reduction in speed that they are likely to cause must be considered, to decide whether the increased density involved is too great in the light of the possibility of air attack. A density of 5 v.t.m. will escape detection, and a density of 20 v.t.m. is reasonably safe against attack.

In general, it will be advisable to order a density for the open sectors well below the safety limit in order to avoid dangerous congestion through the restricted sectors.

5. The passage of military bridges involves single line traffic. On no account can a speed of 10 m.p.h. and a density of 50 v.t.m. be exceeded.

6. *Routes*.—The number of routes available affect the time within which movement can be completed, or, alternatively, the density of the columns, since the total number of vehicles can be split up and allotted to the various routes. Vehicles of varying speed categories can be sent on different roads; under suitable conditions tracked vehicles can move across country. Should only one route be available and vehicles of different speed categories have to be sent along it, the following are the alternative methods of using it:—

- i. The faster moving vehicles may precede the others.
- ii. The slower moving vehicles may be started first and the faster late enough to enable them to move at a convenient speed and density.
- iii. Unrestricted passing may be allowed.
- iv. Vehicles may be divided into speed categories and organized passing permitted of the slowest categories by those greatly superior in speed to them.
- v. All vehicles may be run at the speed of the slowest. This may be necessary for tactical reasons, and is the best method when speed categories do not vary greatly.

7. *Miscellaneous*.—Other factors which must be considered will be the number of hours of darkness and the demands which have been made on drivers and vehicles during the period immediately before the move. The daily range of vehicles can be taken as:—

	Normal miles	Emergency miles
Wheeled vehicles.	150	500
Light tanks, light dragons and machine-gun carriers	100	150
Army and medium tanks, and medium dragons	50	75

Emergency journeys must be followed by compensating periods of rest.

No opportunity should be missed of sending the heavier categories of tracked vehicles by rail.

2. Methods of movement

1. *General*.—Mechanized movement may be carried out by:—

- i. Controlled columns moving at high or low density.
- ii. Independent running by individual vehicles.
- iii. Small groups of vehicles.

2. *Controlled columns*.—A column moving under control at a high density is slow, unwieldy and apt to cause traffic congestion.

Despite its drawbacks, this form of convoy running may have to be adopted for highly organized movements. It may often be used in warfare against a semi-civilized enemy.

A column moving under control at low density is fast and reduces the chances of detection from the air. It retains military organization and thus affords, to the formation commander initiating the move, information regarding the progress of subordinate formations and units, and enables the column to be diverted, wholly or partially, to a new destination.

3. In *independent running* each vehicle runs independently of all others at its most efficient speed, overtaking and halting as desired.

Vehicles are released from a starting point at a given interval in accordance with the density ordered for the move. Each driver is given a written itinerary up to a terminal collecting point. The route is adequately sign-posted or provided with traffic control personnel. At the terminal point arrangements must be made to direct vehicles to the

Provided that the traffic control system can be quickly put into operation, this system enables a move to be started with very little delay, but the column is deprived of its normal military organization and it is therefore difficult to keep an accurate check on the progress of the move.

4. *Small groups of vehicles.*—A modified form of the methods described above is afforded by operating with *small groups of vehicles*. A group may either run in a controlled column, or as freely as an independent vehicle. It is preferable to group together vehicles of the same speed category. It will help in deceiving air observation if the number of vehicles in each group is varied.

The advantages of this method are that it affords a degree of control and drivers are thereby relieved of responsibility.

3. Control of movement

1. Control of a mechanized column during movement is exercised by means of:—

- i. A starting point.
- ii. Control posts.
- iii. Traffic direction and leading.
- iv. A system of dispersal at the destination area.

2. A *starting point* is the place at which a column or group is timed on to the route. Each subordinate commander should fix his own local starting point and the times at which the various sub-divisions of his command must pass it. Units should always move forward to the starting point and should pass it at the speed and density ordered for the move.

On no account should vehicles move to the starting point at a greater speed than that ordered for the march, nor should they attempt to halt at it. If an intermediate halt is desired, it must be ascertained in advance that this will not interfere with the movement of any other units, and that vehicles are not halted on a steep gradient.

3. *Control posts* are points along the route, from 10 to 15 miles apart and are necessary if congestion or interference are likely. They should not be necessary for small moves.

An officer, appointed by the headquarters controlling the move, should be allotted to each post.

The first post along a route may, where suitable, act as the starting point and the last as the dispersal point at the end of the move. They should be located at the near side of the road. Adequate cover should be available for them and, if necessary, camouflage should be provided.

4. *Communication between control posts*, preferably by cable, will normally run from post to post along the route and on to a road movement control headquarters.

When recourse has to be had to wireless, a pre-arranged code should be used. A suggested form of code is given in Appendix V.

5. *Status of a commander of a control post.*—His status and responsibility will be those of a staff officer to the commander. In the event of disagreement between the post commander and officers commanding units or sub-units moving over his sector, the deciding authority must be the post commander.

The control post commander should be provided with transport and assisted by a detachment, the suggested composition of which is:—

- i. One warrant officer or sergeant.
- ii. One orderly, who will act as clerk.
- iii. One motor cyclist despatch rider.
- iv. The necessary signal detachment.

In addition, he should be assisted, if possible, by traffic personnel of the provost service mounted on motor cycles, who will patrol the sector, check traffic sign-posts and carry out general traffic control duties.

6. *The equipment required at a control post should include:*—

- i. A distinguishing flag, and small replica for the post commander's car.
- ii. Traffic sign-posts and lights to illuminate them at night.
- iii. Hand torches.
- iv. A small notice board for displaying messages to passing vehicles.
- v. Traffic control shoes. These will be worn only while actually carrying out traffic control duty.

7. *The duties of a control post commander will be as follows:*—

- i. Reporting the progress of movement. He will report the tail vehicle of each serial or unit to headquarters, through the next post ahead. Similarly, he will pass on all reports received from the next post in rear.
- ii. If so placed, he will carry out the duties of starting point or dispersal point officer.
- iii. He will accelerate or slow down units if necessary. This is best done by means of a notice displayed at the post.
- iv. In the case of an obstruction in his sector, he will co-operate with the unit affected in ordering a deviation. He will make a report of any obstruction or deviation www.vickersmachinegun.org.uk ahead and in rear. He will be responsible for

clearing traffic from between the obstruction and the point of deviation. Vehicles forming obstructions will normally be abandoned by their unit and cleared as opportunity presents.

v. He may be allotted resources to enable him to carry out recovery of broken-down vehicles in his sector. He will control the system of recovery in accordance with his instructions.

8. Unit responsibility includes the reporting of their leading and tail vehicles to control posts. To assist identification all vehicles will be marked with:—

- i. A divisional sign.
- ii. A unit sign consisting of a plate on which is painted the unit serial number (allotted by divisional headquarters) in white on a background coloured to denote the brigade or arm to which the unit belongs.

Unit signs will be shown on both front and rear of vehicles and the plates will also carry, on the reverse, a white "PASS" on a khaki background. This will be displayed whenever a vehicle is halted owing to breakdown, or for any reason not affecting other road users.

9. Vehicles will also be marked with a bridge classification number and will not be allowed to cross any bridge bearing a number less than that on the vehicle.

4. Staff duties in connection with traffic control

1. *General*.—In addition to the actual control of traffic at road junctions and points where congestion is likely to occur, the term "traffic control" will involve:—

- (i) Organization of traffic circuits, one-way traffic and the opening and closing of specified roads.
- (ii) Issue of orders for traffic control, and the preparation and issue of traffic maps.
- (iii) Marking of routes and alternative deviations.
- (iv) Patrolling of roads.

2. Traffic control arrangements, when issued as orders, can often best be shown in the form of a map.

3. Traffic control by the formation ordering the move will normally be undertaken from starting point to dispersal point.

At the dispersal point it will be the responsibility of formation traffic control personnel to direct the main groups of a formation on to the roads leading to their new areas. From the moment when brigades and units enter the boundaries of their areas, traffic control will become their own responsibility.

4. The executive duty of traffic control will normally

be undertaken by provost personnel. No traffic policeman should be posted where the work could equally well be done by a sign.

Provost personnel will be allotted by divisions. If additional traffic control personnel are required in brigades or units they should be provided from unit police or improvised from other motor cyclist personnel.

5. Road signs will normally consist of two types:—

- i. Adjustable arrows.
- ii. Stencilled signs.

Arrows will be used wherever it is required to direct all traffic in one direction. In areas where dispersal or special instructions are necessary stencilled signs will be employed. All signs will be placed on the driving side of the road and, to avoid confusion with two-sided signs, drivers will take no notice of signs on the other side of the road. A sign should be placed a reasonable distance before the necessary turning, and a second sign put where it can be seen on entering the new road.

6. Deviations should be marked with arrows at all doubtful points. It is advisable for these arrows to be different in colour from those on the main route. A short distance before the entrance to the deviation a normal arrow should be placed pointing up the main route. This sign can then be adjusted when it is necessary to bring the deviation into use.

At the entrance to the deviation a board, protected from the weather, should be placed giving information where the deviation rejoins the main route.

If time is not available to mark deviations, or to place descriptive boards in position, deviations should be published in a list or marked on a map. The list or map should be in possession of all officers empowered to order a deviation (*see* Sec. 9, 4).

7. *Arrangements for marking the route* will vary with the type of move.

In strategical moves, particularly at low densities, it will be the aim of the staff responsible for the move to make it impossible for vehicles to stray from the authorized route.

In tactical moves undue reliance must not be placed on the ability of individual drivers to read maps. Route cards, giving the names of towns and villages and approximate distances between them, should be prepared for the use of drivers. Unit and subordinate formation commanders must do everything they can to mark the route ahead of the column by means of motor cyclist orderlies, who may be ordered to direct traffic personally or to mark the route with

8. Halts.—

i. *Short halts by day.*—A mechanized column, traveling under control at high or low density, should halt and re-start all its vehicles simultaneously. Halts should, therefore, be at fixed times. When there is a threat of air interference, vehicles should halt spread out along the route and should pull in under cover where available.

In independent running individual vehicles will require to choose their own halting places under cover. A general control should be kept over the number of halts to be made by ordering approximate times.

In operating with independent groups of vehicles and short convoys, the halting of one group is unlikely to interfere with that of another. There is, therefore, no necessity to order halts at fixed times.

ii. *Long halts by day.*—Long halts will normally be ordered for a move exceeding seven hours in duration. Unnecessary concentration of vehicles into large groups, forming targets for air attack, will be avoided if food can be prepared and distributed to sub units before the move begins. Vehicles can then halt at the fixed hour in small groups, well spread out along the route, utilizing any local cover on or near the roadside.

iii. *Tactical.*—On arrival on a bound M.T. must be cleared off the road, whether concentrated or dispersed, and due precautions taken for concealment from the air.

iv. *Night halts.*—Short halts should be made hourly at ten minutes to each clock hour. On no account should hourly halts be used to close vehicles up, or to regain lost road space.

9. Dispersal at destinations will be facilitated :—

i. If advanced parties carry out a co-ordinated reconnaissance.

ii. If a very complete system of traffic control is organized over the last stage of the route, where the column is split up into subordinate formations and units.

iii. If guides are detailed ready to lead vehicles from the above stage to unit areas.

5. Preparations for a move

1. *Warning order.*—As soon as the commander has laid down the general conditions of movement, the staff

should issue a warning order giving the approximate earliest time of start and orders for movement of advanced and control post parties. Orders summoning subordinate commanders or their representatives to a conference may also be included.

2. *Reconnoissances.*—If a system of road movement control is to be used, the reconnaissance of deviations should be undertaken by control post commanders. Deviations should overlap and, when a single route is used, this can be done by choosing deviations on both sides of the road; but, when two or more routes are used, care must be taken to prevent deviations from different routes from running into each other.

Deviations should be numbered consecutively along the route. In the case of two or more routes, no number should be used more than once.

A mechanized column should never be despatched along a route beyond a point where a turning circuit has been located from the map or, preferably, by reconnaissance. Where there is danger of air attack or observation, a mechanized column will not normally be moved from its position under cover until another such harbour has been reconnoitred to which it can proceed immediately. During the approach march it may sometimes be necessary to select turning circuits and harbours from the map before they have been made good by mobile troops. In these circumstances steps will be taken to have these locations reconnoitred as soon as possible after they have been secured.

6. Issue of orders

1. In order to take full advantage of the mobility conferred by mechanization, units and formations must be trained to carry out moves rapidly and at short notice. There will be no time for elaborate orders.

2. Routine matters affecting all moves should be dealt with in formation or unit standing orders.

3. In formation orders sketches or tracings are a practical method of showing information at a glance. Only where a considerable degree of detail is required will it be necessary to issue a movement table (*see* Appendix VI). Points to be included in orders are :—

Routes.

Speed.

Density.

Halts.

Location of control posts (and composition if differing from Standing Orders).

Allotment of provost personnel. Advance parties.

4. *Unit orders* will invariably include the following points:—

- i. Starting point and time.
- ii. Details of the route.
- iii. Dispersal point and, if possible, destination and instructions regarding dispositions on arrival.
- iv. Speed (m.i.h.).
- v. Density (v.t.m.).
- vi. Traffic control arrangements.
- vii. Halts.
- viii. Lights (at night).
- ix. Protection: anti-tank, anti-aircraft, anti-gas.
- x. Use of wireless.

5. *Orders to individual drivers* must include:—

Convoys running.

Independent running.

Destination and route (place names to be recorded in writing).

Method of marking route.

Table of distances and timings (*see* Appendix VII).

Cruising speed at which to aim (leading vehicles only).

Cruising speed at which to aim.

Average distances to be maintained from vehicle in front, expressed in yards, for normal running, and in defiles.

Minimum distance to be observed between halted vehicles. In the absence of orders to the contrary this will be half the running distance.

7. Administration

1. *Advanced parties*.—These vary from the tactical reconnaissance party, held in readiness to proceed to the next concealed area as mobile troops complete a bound, to purely administrative billeting or bivouac parties. Motor cyclists should be included to assist in traffic control in unit areas.

Advanced parties will provide guides who will take over the responsibility for guiding unit vehicles as soon as a unit has been diverted on to a road which it along uses.

Any breakdowns that cannot be repaired without undue delay by light aid detachments will be moved off the road. A driver from the unit will remain with each of these vehicles and will report to the recovery section at the rear of the column as it reaches them. Units, on arrival at

control points, will report any vehicles left behind on the route.

2. *Repair and recovery*.—In tactical moves and those of small columns operating at high density, light aid detachments should follow the subordinate formations and units to which they are attached. The method of evacuation will vary, and should be the subject of special orders.

On long strategical moves it will be advisable to place all resources under one centralized control. Light aid detachments can then be stationed at intervals along the route, and may be placed under the orders of control post commanders when that system is in use (Sec. 3, 7, v). Recovery sections of field workshops, if available, should move up the routes at the rear of the column. In the case of long distances it may be necessary to establish repair detachments from field workshops at intervals of one day's march along the route.

3. *Road repair*.—In tactical moves repair of damage to roads will be one of the duties of the engineer resources allotted to subordinate formations.

In strategical moves, when air attack is expected, small detachments of engineers should be allotted to control posts or organized at intervals along the route. They should be equipped with road-repairing material and, when available, facilities for bridging craters.

4. *Supplies*.—Supplies for the move will normally be carried with the column, in unit vehicles and those of the formation supply columns. For long moves arrangements will be made for rations to be issued en route.

5. *Petrol*.—All vehicles should carry sufficient petrol, in containers if necessary, to complete a day's march. Emergency petrol points should be established at control posts or at similar suitable intervals to meet accidental shortage of petrol.

6. *Medical*.—For short moves medical detachments should be allotted to infantry brigades and equivalent subordinate formations. In a long move it may be advisable to allot medical detachments to certain control posts and to establish an advanced dressing station halfway along the route. Car posts should be formed at intervals of a day's march to evacuate casualties.

8. Movement by M.T. of units that are not fully mechanized

1. Sufficient mechanized transport to carry all the marching personnel of a division will not always be available. The best use will then be to lift portions of

the formation forward on successive days to the maximum daily distance attainable by M.T. The strategical or tactical situation may demand, however, that the whole formation be lifted forward a lesser distance on each successive day. This latter method of movement is more difficult to conceal, owing to the increased activity over comparatively short stretches of road.

2. Units carried in M.T. must take with them such arms, equipment and unit transport as will enable them to fight.

3. When it is necessary to achieve the greatest possible daily distance, a combination of marching and carriage by mechanized transport may be arranged.

The following formula gives the distances that can be covered using mechanical transport on the shuttle system, combined with marching :—

$$\text{Distance} = \frac{x-y}{z} + y,$$

where x —maximum distance which the mechanized transport can cover in the time available

y —maximum distance which troops can march within the same period

z —number of trips carried out by the mechanized transport (out and return counting as two trips)

It should be remembered, however, that this purely mathematical formula takes no account of any tactical or operational factors. In addition to the normal factors for movement of a mechanized column, the following extra time should be allowed :—

- i. For embussing and debussing, 15 minutes each.
- ii. 45 minutes at the end of each trip to give drivers time for meals, rest and maintenance.

4. Points for embussing require careful selection and should be previously reconnoitred. Methods of embussing include :—

- i. Simultaneous embussing by a whole formation or unit formed up along a stretch of road. This method is quick and suitable if the whole operation can be concealed from air observation.
- ii. Successive embussing from a short stretch of road. This method is slower but easier to conceal.
- iii. Dispersed embussing in or near sub-unit areas. This method complicates control, but is suitable for dispersed movement, particularly by independent vehicles or groups.

5. Preparation for embussing should not be necessary for method iii. For i and ii the transport should form

up in small groups of vehicles. The leading vehicle of each group will be marked by a distinctive flag, and a similar flag will mark the point where it is to draw up. A suitable interval should separate the groups. Troops will be detailed to each group and should, if possible, reach their embussing points before the vehicles arrive.

6. Much the same considerations govern the choice of debussing points and methods, chief among them being the necessity and facilities for concealment from the air and the rôle allotted to the troops on arrival. In addition, there should be a turning circuit for the vehicles near any debussing point. Orders for the move should always contain instructions for the disposal of vehicles after the debussing of the troops.

7. The command of a mechanized column composed of personnel travelling in reserve transport will normally devolve on the commander of the personnel. He will be responsible for the guiding of the column, for ordering deviations, and for all orders affecting tactical safety. He will consult the R.A.S.C. officer on all matters affecting the proper working of the transport and will avoid all interference in technical matters which must receive full consideration, unless they are likely to endanger the safety of the column. The R.A.S.C. officer will therefore be responsible for march discipline, for regulating the cruising speed, for technical control and for dealing with breakdowns. The column commander will give the order for embussing and debussing. He and his officers will be responsible for taking action on meeting an obstruction and for action in the event of a tactical emergency. A sufficient number of officers must be detailed to travel in the column to carry out these duties.

8. The column commander and the R.A.S.C. officer in command of the transport should travel in the same car or in cars following each other, as should also unit commanders with their respective mechanized transport section commanders. The commander of a group should travel on the driver's seat of the leading vehicle of his group. Officers should be evenly distributed through the column and must be acquainted with the destination and route.

During the period when the personnel have debussed but the mechanized transport is still under command of the formation or unit concerned, the R.A.S.C. officer in command of the transport should remain with the formation or unit headquarters ready to receive his orders. He must also be in communication with his vehicles.

9. Unit leading and traffic control

(not applicable to independent running)

1. The unit commander of a mechanized unit is responsible for:—

- i. Ensuring that his unit follows the correct route.
- ii. Ordering deviations.
- iii. Regulating cruising speed to maintain the speed (m.p.h.) ordered.
- iv. March discipline.
- v. Dealing with breakdowns.

2. In the absence of control organized by the higher command, every unit is responsible for its own traffic control. This is best effected by sending motor cycle orderlies on ahead to act as point duty men. The orderly guides his unit past and then reports to the head of the column.

3. An officer, who may be the commander, will move at the head, and another officer at the tail, of all units and sub-units (companies, etc.). A group commander will travel in the leading vehicle of his group. It will be of assistance if a proportion of the remaining officers, mounted on motor cycles, patrol the column. Whenever possible, a N.C.O. on a motor cycle should move in the rear of groups or in rear of an equivalent number of vehicles when running evenly dispersed.

Pace-setters will be provided with a table, a specimen of which is given at Appendix VII. Signals for use in controlling columns are given in Appendix VIII.

4. On meeting an obstruction or damage to the road, the nearest officer (or senior N.C.O.) will hasten to the obstruction and, unless it can be rapidly cleared, take the following action:—

- i. Send another officer, N.C.O. or despatch rider down the column to order all vehicles in rear to halt without closing up. This despatch rider should continue to the control post next in rear with a verbal message stating the site of the obstruction, and the estimated time to repair or remove it.
- ii. Reconnoitre rapidly for a local deviation along tracks, through fields or across country.
- iii. Arrange a party to clear the obstruction. If necessary, anti-aircraft defence must be organized.

- iv. If no local deviation is possible, and the obstruction will take some time to clear, inform vehicles halted in rear of the situation. If empowered, he will select the first suitable deviation either from a deviation list, board or marked map, or from his own map. If the last method is used, a reconnaissance will be necessary. A sub-unit (company, etc.) commander and above will normally be empowered to select and order a deviation.
- v. Inform the control post what action he has ordered.

10. Night movement

1. The following general rules will be observed by vehicles when light restrictions are ordered:—

- i. No naked lights will be shown, and there will be no smoking.
- ii. No lights will be switched on until they are essential, and they will be switched off the moment it is light enough to see without them.
- iii. Vehicle lights will be restricted in accordance with standing orders.
- iv. At halts, all lights will be switched off; side lights of leading vehicles and tail lights of rear vehicles may be left on when other traffic is using the route.
- v. All torches will be dimmed with suitable covers; dashboard lights and those in wireless vehicles will be efficiently screened.
- vi. Driving mirrors will be deflected.

2. Traffic guides should be provided with blue lights. All drivers must be warned, before a night march, what traffic control signals are to be used.

3. Checks will be indicated from a vehicle to the next in rear by a series of short flashes on the stop light of the foot brake. The same signal may again be used to indicate that a vehicle is about to move off.

4. Drivers and their assistants should be frequently relieved, at every halt if possible. They should not be used to relieve each other.

11. Breakdowns and unforeseen halts

1. It is essential to avoid blocking roads. Headquarters, units, sub-units and single vehicles obliged to halt will get

clear on to the verge of the road or into a field. A driver seeing a vehicle halted in front of him must, on reaching the minimum distance ordered, himself halt unless he receives the signal to pass. For this reason the driver of every vehicle making an unrecognized halt will ensure that vehicles behind him are given permission to pass by the display of the sign referred to in Sec. 3, 8.

2. Breakdowns must at all costs be got clear of the road until the arrival of the light aid detachment. Troops will debus and take cover clear of the road. Whenever possible, one breakdown vehicle, capable of towing, should move in the rear of each unit.

3. A vehicle which has been repaired will wait until the first gap appears and will take its place in rear of that portion of the column. In independent running it may join in when ready. Light aid detachments must on no account hinder the passage of the column, and, if the breakdown is of no hindrance, it may be left to be picked up when the column has passed. A light aid detachment or recovery section normally follows a column to bring in such vehicles.

12. Action in case of air attack

In the case of a direct attack by day or night, vehicles will halt, clear of the road if possible. Anti-aircraft light machine guns will at once engage the enemy, and at night lights will be put out. Troops will debus and all who can will also engage attacking aircraft with fire. No rifle fire, however, will be permitted while still on the move. In the event of an obstruction or damage to the road, action will be as described in Sec. 9, 4.

When at rest, those not detailed for protective duties will take cover in accordance with orders previously received.

APPENDIX I MAXIMUM CRUISING SPEEDS THAT CAN BE EXPECTED OF SERVICE VEHICLES

Wheeled vehicles

Car, light armoured, reconnaissance car ..	50 m.p.h.
8-cwt. truck, 15-cwt. truck, 12-cwt. van, motor ambulance	35 m.p.h.
30-cwt. lorry (4- and 6-wheeled)	30 m.p.h.
Field artillery tractor with gun only ..	30 m.p.h.
3-ton lorry (6-wheeled)	25 m.p.h.
Field artillery tractor with gun and trailer	
* Medium artillery tractor, Scammell ..	20 m.p.h.
* Heavy artillery tractor, Scammell ..	15 m.p.h.

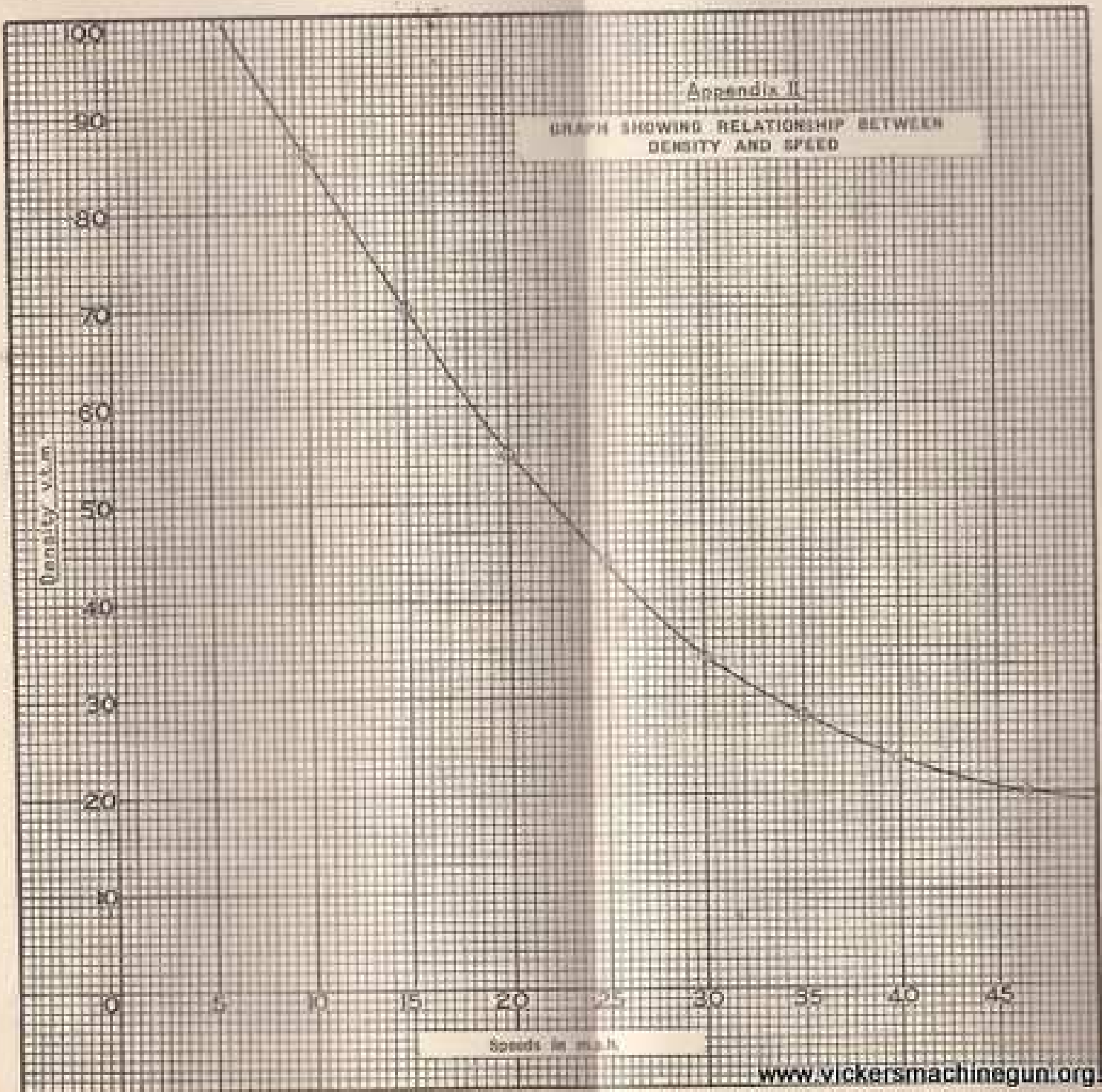
Tracked vehicles

Cruiser tank, Mk. II	25 m.p.h.
Light tank, Mk. VII	
Light tank, Mk. II	
Bren carrier	20 m.p.h.
Infantry	
Scout	
Anti-tank	
* Light dragon, Mk. III	
Cruiser tank, Mk. I	15 m.p.h.
Infantry tank, Mk. II	10 m.p.h.
.. .. Mk. I	5 m.p.h.

* Depends on load being towed.

Appendix II

GRAPH SHOWING RELATIONSHIP BETWEEN DENSITY AND SPEED



APPENDIX III

Formula for calculating increased density necessary to compensate for reduction in speed.

Where a —cruising speed in m.p.h. before entering a restricted section,

b —reduced speed in m.p.h. through the section,

d —density ordered for the move,

then—

$d \times \frac{a^2}{b^2}$ will give the increased density necessary within the restricted sector to avoid loss of road space on the far side.

APPENDIX VI
SPECIMEN MOVEMENT TABLE FOR MECHANIZED FORMATION OR UNITS

(Only columns applicable to a particular move should be used.)

Appendix to Operation Order No.

Copy No.

Serial No.	Date	Formation or unit	Number of vehicles	Place		Time past S.P.	Route	Speed to S.P.	Speed and density during march		Dispersal point	Remarks
				From	To				v.c.m. (l)	m.i.h. (m)		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(o)

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NOTES.

1. The form of the table must be kept as simple as possible, e.g. :-

- i. It may be necessary to omit columns (e) and (f) for security reasons.
- ii. Column (d) is for the staff and road movement control posts. It should be omitted from formations and unit orders if the road movement control system is not organized.
- iii. Columns (g), (h), (i), (j), (k), (l), (m), (n), if they do not vary, can be placed as data at the head of the table.

2. Remarks column may include such points as :-

- i. Detail of personnel in vehicles of another unit.
- ii. Details of any special route to S.P. and responsibility for traffic control between billets and S.P.
- iii. Change of speed and density.
- iv. Any necessary instructions for the march not included in the operation order.

3. In the case of a table for a single route with few control points, the time past control points may be included in the table as for S.P. Otherwise a more convenient method of showing these times in the form of the table below.

Table of approximate distances from S.Ps. to Control Points at 20 m.i.h.

Route A			Route B			Route C		
S.P. to :-	Distance	Time Hrs. Mins.	S.P. to :-	Distance	Time Hrs. Mins.	S.P. to :-	Distance	Time Hrs. Mins.

APPENDIX VII
TABLE FOR PACE-SETTERS AND DRIVERS

Table of distances and times at m.p.h.

Starting point to (a)	Distances Miles (b)	Time (c)		Time of passing (d)
		Hrs.	Mins.	
S.P.	—	—	—	•

Notes.

Time of passing the starting point is filled in at * by pace-setters, and by all drivers in independent running. The actual times when the other places in column (a) should be passed are obtained by adding their timings in column (c) to the time *. They are then written in column (d) and a check is then kept on the speed (m.i.h.) of the vehicle.

APPENDIX VIII

Signals for use in controlling columns :—

	Visual	or	Whistle
	(Preceded, if necessary, by the short cautionary whistle blast.)		
I. Start engines.	Circular motion of the right hand as if turning a starting handle.		One long blast.
II. Switch off.	Arm extended downwards, waved across the body, parallel to the ground.		Ditto.
III. Mount.	Two or three slight movements of the open hand upwards (palm up).		Ditto.
IV. Dismount.	As in III above, but downwards (palm down).		Two long blasts.
V. Last order completed.	The salute followed by the hand raised vertically above the head, open and fingers together.		—
VI. Halt.	Arm raised perpendicularly above the head.		No signal.
VII. Enemy aircraft in sight.	Both arms held above head and hands waved.		A succession of long blasts (on whistle or horn).
VIII. Enemy aircraft attack ended.	—		Two long blasts repeated at intervals of 5 seconds.

