CONSTRUCTION OF A MASS MINIATURE RADIOGRAPHY VEHICLE

BY

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In October, 1955, information was received to the effect that a Mass Miniature Radiographic set was about to be shipped to Singapore from the United Kingdom and that a vehicle would be required to house it; the vehicle was to be selected from local stocks and modified to requirements.

This information came not a moment too soon as the existing M.M.R. vehicle, which this was due to replace, was on its last legs, having done yeoman service for about five years and covered an enormous mileage.

A Board of officers was duly convened consisting of a representative from R.E.M.E., Ordnance and Command Secretariat, with myself as Chairman, for the purpose of drawing up specifications for the modification of an existing theatre type of vehicle to house a tropicalised M.M.R. set.

Hitherto it had been the practice in the Army for a M.M.R. set to be unloaded on its arrival at its destination and be set up at some convenient hut or room where radiography was to take place; the generator vehicle would draw up alongside to supply the power, except where the local mains supply was of adequate amperage. On completion of its programme the set would be reloaded on to its vehicle. This frequent man-handling of the heavy and cumbersome components up and down a ramp, without the assistance of a crane, not infrequently led to the delicate mechanism being put out of adjustment, so that programmes were upset, radiographic results were unsatisfactory and frequent calls were made on R.E.M.E.

This seemed a suitable opportunity therefore for modifying a vehicle in such a way that the X-ray set would not have to be removed from the vehicle during radiography, and thus it was hoped to improve the efficiency of the M.M.R. service.

The Board, having assembled, proceeded to a large Ordnance Vehicle Park, where it inspected a huge array of vehicles ranging up to ten tons in size; after an exhaustive search the Board reached the conclusion that no suitable vehicle existed, and retired to Singapore to think again. The next day it was suggested by a R.E.M.E. officer that the best course might be to build a body of the required dimensions on a chassis of a Bedford Scammell semi-trailer 6-ton cargo vehicle. This idea was approved and a detailed plan was prepared giving the required layout of the radiography room and darkroom and their equipment.

The task of construction was allocated to 40 Base Workshops, R.E.M.E., in Singapore; the chassis was taken to pieces and construction started anew;
sheet steel was used in the building of the body of the trailer, which was completed in five and a half months.

The trailer, which is of fairly large dimensions, is coupled to a prime mover, thus making it an articulated vehicle; it is not the intention that the prime mover be uncoupled from the trailer, but should this become necessary two small supporting wheels are let down in front which, together with two built-in jacks used on blocks, give it good stability during radiography.

The trailer is divided into a radiography room behind and a darkroom in front separated by a lead-lined partition and sliding door which exclude light and radiation from entering the latter.

### Measurements of trailer

<table>
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<tr>
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<th>Height</th>
<th>Length</th>
<th>Width</th>
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<tbody>
<tr>
<td>Overall</td>
<td>11 ft. 6 in.</td>
<td>19 ft. 1 in.</td>
<td>8 ft. 6 in.</td>
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<tr>
<td>Radiography room</td>
<td>7 ft. 11 in.</td>
<td>12 ft.</td>
<td>8 ft. 2 in.</td>
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<tr>
<td>Darkroom</td>
<td>6 ft. 6 in.</td>
<td>6 ft. 7 in.</td>
<td>8 ft. 2 in.</td>
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**Radiography room**

The X-ray set is mounted with its tube facing the rear. A patient enters by a side door, steps into position as directed by the positioner, is radiographed and leaves by the opposite side door in a matter of seconds. Enough floor space was provided to enable the set to be used in the 60-inch position as is required when large films are taken. It was thought that the N.C.O. radiographer, on scanning the processed film strip, would be able to pick out the more obviously abnormal films, take large films where necessary before leaving the unit, and so save time and some additional work for hospital X-ray departments.

The control table and its mounted protective screen are set at an angle which is adjustable by altering the bolt-hole positions in the floor to enable the optimum position to be attained in the protection of the radiographer; a second screen is provided for the positioner, who after positioning the patient retires hastily behind it.

Large doors are mounted at the rear to enable the equipment or heavy components to be removed should a major workshops overhaul become necessary. A specially designed wooden desk is provided for use by the clerk outside the vehicle. This is stowed in front of the rear doors, and beneath this is housed the X-ray tube in its sprung cradle within its box, all secured by web strapping. The positioner’s screen is stowed against a side wall mounted on sorbo rubber cushions. The bases of the transformer and camera stand are clamped to the floor and remain rigid during transit; the camera is removed and stowed in its box in a cupboard in the darkroom. Electric fans are supplied to ensure air movement. A cupboard for holding record cards is fixed to the wall to enable the positioner to deposit them during radiography. A number of lockers are fitted mainly for the storage of personal belongings of the staff. A bench type padded seat is provided for use of the individual travelling in the trailer.
Darkroom

This is air conditioned by a 3/4 h.p. unit salvaged from the old M.M.R. vehicle. There is plenty of room for the radiographer to process his films without feeling cramped. A loading bench is provided on each side; under one which is hinged is located a set of 15-inch by 12-inch processing tanks for handling large films; in addition, a sink, viewing box, cupboards, typewriter, 35 mm. processing equipment, hangers, cassettes, safelights and other apparatus are supplied.

Water is pumped from a large tank below to a smaller one above by means of a hand pump; it is then fed by pipe to the sink; a rubber hose can be connected to the tap when it is required to fill up the large processing tanks. A 35-foot rubber hose is provided to enable the large tank to be filled from a convenient water source.

The film cupboard is lead lined to prevent any chance of the films being fogged by radiation in the event of the sliding door being left open during exposure. No drying apparatus was considered necessary as 35 mm. film, being very thin, dries fairly quickly.

Electric power

A three-ton lorry mounting a 15 KVA, 230 volt a.c. diesel generator provides the power for operating the set, normal lighting, air conditioning plant, and for charging the trailer's battery through the battery charging apparatus mounted beneath the vehicle. The battery supplies emergency lighting and power for the fans and safelights. The generator is connected to the trailer by a 20-yard heavy duty cable.

Staff

The M.M.R. team comprises a sergeant radiographer, two general duty men and two drivers; one of the two general duty men acts as a clerk and the other as a positioner. Although this staff is well below the authorised establishment of an M.M.R. team, it functions smoothly; there is difficulty in ensuring regular leave, however, especially for the radiographer.

General

During construction, a great many difficulties were overcome. For instance, the darkroom layout had to be redesigned completely because the air conditioning unit would not fit satisfactorily in its originally planned location. When the prime mover was received it was found that its petrol tank only held about 15 gallons, so it was decided to increase the vehicle's range to about 240 miles by fitting holders for jerricans; these were welded to the chassis.

There was considerable doubt as to whether the brakes would be adequate to hold the vehicle, as none, other than parking brakes, were fitted to the two road wheels of the trailer; the only available road brakes operated on the four road wheels of the prime mover. It was decided after several hill tests to allow the vehicle to function for several weeks and to recall it for examination after some
working experience had been gained by the team; the brakes, door locks, jacks and floor covering were then reported faulty and duly rectified.

As no form of warning device had been installed in the trailer to enable a passenger on finding some fault developing—such as loose equipment—to warn the driver, a push button and warning horn were installed.

From reports received, the vehicle has functioned well and in accordance with expectations. Perhaps the best index of its worth is the number of cases handled: in its first five full working months up to the end of December, 1956, it has handled an average of 3,238 cases per month, a most satisfactory figure considering the long distances involved. Interpretation of these films is carried out by the radiologist at the B.M.H., Kinrara.

It is hoped that construction of a second M.M.R. vehicle of similar design, for which the X-ray set is already available, will start soon.

Much credit is due to Captain J. Hardie, R.E.M.E., who was in general charge of construction of the trailer; to Staff-Sergeant J. Greaves, R.E.M.E., who with his Chinese technicians actually built it; and to Lieut.-Colonel G. A. Marsh, R.E.M.E., who as officer in charge of Workshops was largely responsible for the technical design and who first suggested the type of chassis to be used.

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TREATMENT OF CRUSH INJURY OF THE CHEST BY INTERMITTENT POSITIVE PRESSURE RESPIRATION AND CONTINUOUS CURARISATION

BY

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The method of treatment of crush injury of the chest is dependent to a large degree on the type and severity of the injury. Treatment may range from strapping, rest and analgesics in the milder cases to skeletal traction and plaster in the more severe. Hagen (1945) and Brooks (1942) have used mechanical respirators with considerable success. Gray (1942) and Watson-Jones (1955) also advise their use. Recently, Hulman (1957) summarised the rationale of tracheotomy described by various authors in the past: Carter & Giuseffi (1951, 1953, 1954), Von Leden (1953), Gray (1954), Williams (1951, 1955), Baronovsky, Dickman & Vanderhoof (1950), Avery et al. (1955, 1956) have described treatment with continuous hyperventilation and intermittent positive pressure.

This paper is the record of a failure, but the patient, moribund on admission with a “stove-in” chest, was kept alive for six days, so it is felt that a description of the methods used, mistakes made, and lessons learnt is worth reporting.