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MILITARY MONOGRAPH

TITLE: **INDIVIDUAL TANK-INFANTRY COMMUNICATIONS**

SCOPE: A consideration of the means of communication available to the smallest tank-infantry team, the advantages and disadvantages of the various means, and suggestions for modification of present communication equipment.

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INDIVIDUAL TANK-INFANTRY COMMUNICATIONS

By Captain James J. Butler

Tactical operations during World War II clearly demonstrated that the most effective ground force team was one composed of tanks and infantry operating in close coordination. Certain very special operations may not permit the employment of tanks but, generally speaking, a closely coordinated tank-infantry team, supported by artillery, met with much greater success than either tanks or infantry operating alone. Each component of the team is capable of overcoming certain inherent weaknesses of the other component, thus increasing the effectiveness of the team as a whole.

The term "individual tank-infantry team" as used in this ~~article~~ manuscript is not intended to imply that one tank and a squad or platoon of infantry are operating alone. The purpose is to consider the communication problems of the smallest tank-infantry unit which actually forms part of a larger unit.

The key to securing close coordination within the tank-infantry team is an adequate communication system. The dismounted infantry must be able to communicate quickly with the tank in order to secure the support of the tank weapons in reducing enemy machine guns and foot troops which may hold up the advance of the infantry. Likewise, the tank must have good means of communication with the infantry in order to secure their support in reducing anti-tank guns, bazooka teams and other enemy installations which are a threat to the tank. In other words, the effectiveness of the tank-infantry team is dependent upon adequate and continuous communica-

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tion between the two components of the team.

The means of communication available to the tank-infantry team are: 1 - radio; 2 - wire; 3 - visual signals; 4 - messenger or liaison; 5 - sound signals; and 6 - external tank interphone. We shall consider each of these means in detail and take into account their advantages and disadvantages. This ~~manuscript~~ <sup>article</sup> will deal mainly with the two primary methods of tank-infantry communication: the external tank interphone and the radio.

Communication between headquarters of units of company or larger size does not present a major problem and is not considered ~~in this monograph~~ <sup>here</sup>. It must be borne in mind that the communication problems considered here are primarily those encountered by the individual tank and the small infantry unit operating directly with this tank.

A basic principle of combat communications is that more than one means must be available in order that a channel will still exist even though the primary method has failed. <sup>1</sup> A good communication system must also be simple and flexible. The need for an elaborate system can be eliminated, to a large extent, by joint training of the units and detailed planning on the part of both commanders. <sup>2</sup> Adequate means of communication must be provided in any event because combat conditions frequently prevent joint

1. FM 17-10, Ch. 5, par. 43, Apr 45.

2. Lt. Col. L. S. Carroll, USAFPE Board Report #203, p. 3, 4 Feb 45.

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training of the units prior to their joint employment.

We shall first consider radio as one of the means available to the team. A tank platoon is authorized the following radios: one SCR-508 in the platoon leaders tank; one SCR-528 in each of the other four tanks; one each AN/VRC-3 in the platoon leaders and platoon sergeant's tanks. Note that three tanks in each platoon are not equipped with an AN/VRC-3 radio. The armored infantry rifle company is authorized one SCR-300 in company headquarters; six SCR-510; six SCR-536; and one SCR-508. The rifle company in an infantry division is authorized one SCR-300 and seven SCR-536 radios. The SCR-300 and the AN/VRC-3 radios are basically the same. They differ only in that the SCR-300 is a portable set and the AN/VRC-3 is designed to be mounted in a tank.

Now let us consider the possibility of netting the radios in the armored infantry company with those in the tank company. The armored infantry will normally be dismounted during operations, and therefore, their SCR-508 and SCR-510 sets will not be available for direct communication between the infantry on foot and the tanks. The SCR-510 can be converted to the SCR-509, which is a portable set. However, the SCR-509 is too cumbersome to serve as a practical portable radio for infantry troops. The SCR-536 sets carried by the infantry will not net with any of the tank radios. This leaves one SCR-300 in the infantry company headquarters to net with the seven AN/VRC-3 radios in the tank company.

RELAY SYSTEM *modified*

One method of securing radio communication is through a system of relays. A message originating in the infantry platoon may be

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sent to the infantry company headquarters by means of the SCR-536 sets. At company headquarters the SCR-300 may be used to relay the message to one of the tanks which is equipped with an AN/VRC-3. In the case of an armored infantry company in which a SCR-510 is available at company headquarters, this set may be used to relay the message to any tank in the platoon. Any relay system is slow and cumbersome though, and is likely to result in delay or error in transmission.

Thus it is noted that with the radio sets which are authorized to the tank company and the infantry company -- either armored infantry or regular infantry -- direct radio communication between the individual tank and the small infantry unit do not exist.

During the recent war, many units tried various ways of augmenting the authorized tank and infantry radios in an effort to improve radio communication. One method was to issue SCR-536 sets to the tanks. This gave the individual tank a radio which would permit direct communication with the infantry platoon. However reports from both the European Theater and the Pacific Theater indicated that the SCR-536 did not give completely satisfactory results when operated from a tank. <sup>3, 4</sup> The range of the SCR-536 is very limited and it was found necessary to operate the set either on the outside of the tank or with the antenna projecting through an

3. Col. G. M. Dean, ETO Observer's Report, p. 8, 23 Mar 45.

4. Lt. Col. L. S. Carroll, USAFFE Board Report #203, p. 3, 4 Feb 45.

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5-Communication

open tank hatch. A more satisfactory solution was to equip the infantry with a SCR-300 in each platoon and to install an AN/VRC-3 in each tank. It was found that without SCR-300 communication ~~communication~~ between tanks and infantry, the cooperation of the two units was materially impaired. <sup>5</sup>

Another important means of communication available to the team is an external telephone handset mounted in a steel box attached to the rear of the tank. The handset is connected with the tank interphone system. This system was developed through a series of field expedients. An improvised telephone system was first used which permitted the infantryman to talk with a member of the tank crew. A telephone inside of the tank was connected to a length of field wire which extended fifteen or twenty feet behind the tank. An infantryman carrying a field telephone could connect it to the wire and communicate with the tank crew. <sup>P</sup>The weakness of this system is apparent. The wire trailing behind the tank would become entangled in the tank track or around some other object and would be ripped loose. The next step in the development was the installation of an interphone box mounted in an improvised metal box on the rear of the tank and connected into the interphone system. With a handset connected to the interphone box, the infantryman could lie alongside or under the tank and talk with the tank crew. This system functioned well in dry weather but in damp weather, moisture would get into the interphone box and ground

5. Maj. C. J. Madden, Observer's Report on Armor, p. 2, 14 Apr 45.

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out the entire interphone system. The final development was the installation of an <sup>external</sup> ~~external~~ interphone in a moisture-proof metal box on the rear of the tank. A signal light on the outside of the tank is used to indicate that the tank crew desires to communicate with the infantry.

The chief advantage of this system is that it provides a positive and direct means of communication. Its main disadvantage is that the infantryman may be reluctant to expose himself during an artillery barrage, and at times, the tanker may have difficulty in getting a response to his light signal. This illustrates the necessity for having more than one means of communication available. However, the external tank interphone has proved a very reliable system.

Some units in the European Theater were of the opinion that tank-infantry radio communication need not extend below the infantry company. In their opinion, the external tank interphone was satisfactory as the primary means of communication between infantry units smaller than a company and the individual tank. <sup>6</sup> The external interphone is an excellent system of communication between the individual tank and the small infantry unit. However, as mentioned previously, at times when the tank is under artillery fire, it may not be a continuous means. Therefore, radio should be available as a parallel channel.

6. Col. G. M. Dean, ETO Observer's Report, p. 8, 23 Mar 45.

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F-Communications

## USE OF WIRE

(subhead)

Wire is a means which can be used in some very unusual situations. As the role of the tank in combat requires that it be mobile, wire will be used very infrequently. In certain defensive situations where it is expected that the tank will remain in position for a considerable length of time, telephones may be installed. However, wire must be considered to be only a secondary means of communication as it will be disrupted as soon as the tank is moved. The tank-infantry team is normally moving while it is fighting, thus the use of wire is not practical.

Visual signals and sound signals offer another means of tank-infantry communication. Visual signals consist of the use of arm and hand signals, pyrotechnics, tracer ammunition, and lights. Sound signals can be used to convey certain prearranged messages by tapping on the hull of the tank. Both visual and sound signals are supplemental means of communication and must be augmented by other systems such as the external interphone or the radio. These methods also require prior joint training of the team. They are excellent for conveying short, prearranged messages. However, to be of practical value, the members of the team must be thoroughly familiar with the meaning of all prearranged signals. The principle use of smoke and tracer ammunition is the designation of a target which one member of the team has located and wants the other member to take under fire. The effectiveness of visual and sound signals will depend entirely upon the joint training or previous joint combat experience which the team has had and the coordination and detailed planning by both commanders.

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The use of messengers or command liaison is necessary at times. In teams as small as the individual tank and a small unit of infantry, it is frequently necessary for the commanders to establish personal contact, either by the tank commander dismounting or the infantry commander climbing up on the tank. Messenger and liaison may also be considered as a means of communication available to the team.

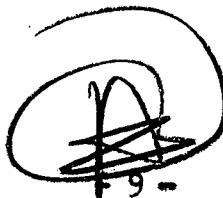
To summarize, the primary means of communication available to the individual tank and the small unit of infantry operating with it is the external tank interphone. The supplemental means are: visual signals; sound signals; and liaison. Radio is the primary means of communication between the tank section or larger tank unit operating with an infantry company or larger infantry unit. Considering the radio equipment which is authorized to the tank platoon and the infantry platoon -- either armored infantry or regular infantry -- it is evident that radio communication between the individual tank and a platoon or smaller unit of infantry is not possible unless a relay system is used. Radio sets should be designed which would provide satisfactory communication between the individual tank and an infantry unit of platoon or smaller size.

The preceding considerations bring us to certain conclusions. Even though the infantry is authorized radio equipment down through the platoon, direct radio communication between the infantry platoon and the individual tank is not possible because the radios with which the two units are equipped are of different types and will not net. There is a need for redesigning the radio equipment used

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by the various arms. The ground forces need a common type of radio which will combine the best features of the SCR-300, SCR-536, and SCR-508. It is realized that different types of radios are used by different units in order to avoid interference caused by too much radio traffic on a common channel. This objection could be eliminated to a large extent by extending the frequency range of a radio such as the SCR-508.

A frequency modulated radio similar to the SCR-536 in size, weight, and range would be an ideal set for the small infantry unit. Such a radio would require only two or three channels and could net with the primary radio in the tank. In this case only one radio would be needed in the tank. A radio in which the range is limited to approximately one mile would cause very little interference with adjacent units. Since it needs only a limited number of channels and could be made compact and light weight, it would be especially suitable for use by dismounted infantry. Such a set would provide the small infantry unit direct communication with the tank with which it is operating. A radio of this design would eliminate the difficulties which exist now as the result ~~of the system~~ of the use of a system of relays and, to a large extent, would forego the necessity of establishing physical contact between the commanders.

  
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