COMMUNICATION PROBLEMS

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When the situation reaches a point where centralization takes place, the battalion communication officer regains direct control of the communication system. With this system the battalion is welded into a single unit of fire power. The battalion commander becomes, in effect, commander of a battery of twelve guns, which is capable, however, of splitting into three independent units when the situation so demands. On the efficiency of the communication system depends the effectiveness with which the battalion commander can employ the fire power of his battalion.

When an action has progressed to a point where centralized control is necessary, the three gun batteries are virtually useless to the battalion commander until communication is established. He is in somewhat the same position as a gun battery commander who has lost contact with his battery. Since increased emphasis is thus placed on speed in establishing communication, greater dependence is placed on the use of radio.

Under the present Table of Basic Allowances the three gun batteries are each allotted three SCR-194 radios, and the battalion headquarters battery, seven. The method of

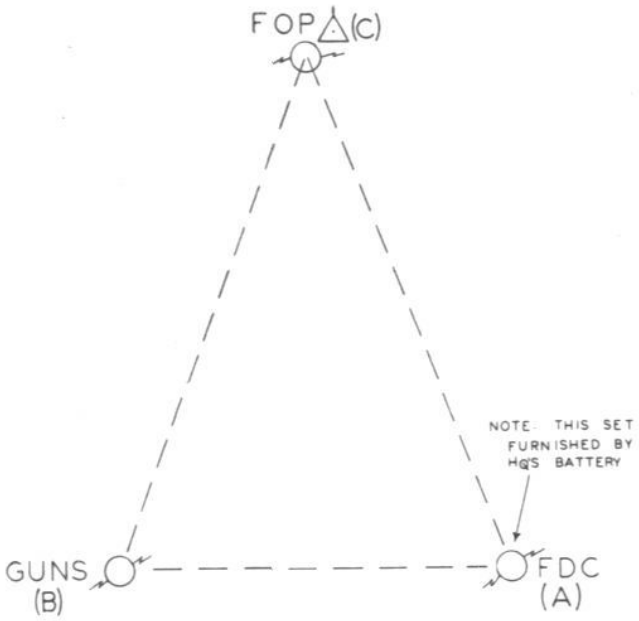

Figure I

their employment "depends on the situation," but the basic radio net will be according to Figure 1. When operating as a receiver, the SCR-194 transmits a high-frequency signal. For this reason, it is usually impossible to operate three sets at the same time on the same frequency. Note that the receiver transmits the signal and that the word "usually" is used. This signal does not interfere with two-station operation because the SCR-194 is a trans-receiver; i.e., the parts used for transmitting are also used for receiving. It is converted from a receiver to a transmitter when the push button on the microphone is depressed. This operates a relay, changing the electrical circuit. It is either a receiver or a transmitter, never both.

In the three-station net, shown in Figure 1, this energy radiated by the receiver of A will block reception by B of transmissions from C if B is within range of the receiver signal. In like manner, the signal radiated by the receiver of B will block reception by A of transmissions from C. Range of the signal varies with atmospheric conditions and terrain, but is generally effective for about fifteen hundred yards. The set at the guns and the set at the fire-direction center will normally be well within this range. The set at the forward observation post will normally be out of range of the high-frequency receiver signal of the other two sets.

If the set at the fire-direction center (A) and the set at the guns (B) are operating as receivers at the same time, neither will be able to hear the forward observation post (C). The receiver signals of A and B block reception of the transmissions from the forward observation post for each other.

However, because the receiver signal of the forward observation post set is out of range of the other sets, A and B can communicate with each other. Therefore, under normal conditions either the set at the fire-direction center or the set at the guns must be shut down if communication is to be established and maintained by one of them with the forward observation post. Which set should be shut down? No hard and fast solution to fit every conceivable case can be offered, but below is described a method which will apply in many instances.

Situation: The battery is operating independently. The forward observer is in direct radio contact with his battery. No communication has been established with fire-direction center. Centralized fire control may be achieved in the following manner (refer to Figure 1):

The set at fire-direction center contacts the set at the guns. The set at the fire-direction center and the set at the guns, though now unable to communicate with the forward observation post, for the reasons outlined above, can nevertheless communicate with each other. Fire-direction center can now control the fire of the battery, given the means of observation. When wire communication is established between fire-direction and the guns, the set at the guns shuts down. Communication between

the forward observer and fire-direction center is then established. When wire communication is broken, the gun set begins operation immediately.

To illustrate the application of this method, assume the following common situation:

The battalion has been ordered to displace forward. Battery A is to move first, accompanied by the necessary personnel and equipment from headquarters battery. As soon as it is in position and ready to fire, Batteries B and C will follow.

Battery A moves forward and into position. Radio communication is immediately established with the forward observer, if it has not been maintained during the march. The forward observer can now fire the battery. Wire communication is established between fire-direction center and the gun position. The gun radio set shuts down. The set at fire-direction center establishes contact with the forward observer. The forward observer and the liaison officer can now fire the battery, though this is a secondary mission of the liaison officer. The radio net is now shown in Figure 2.

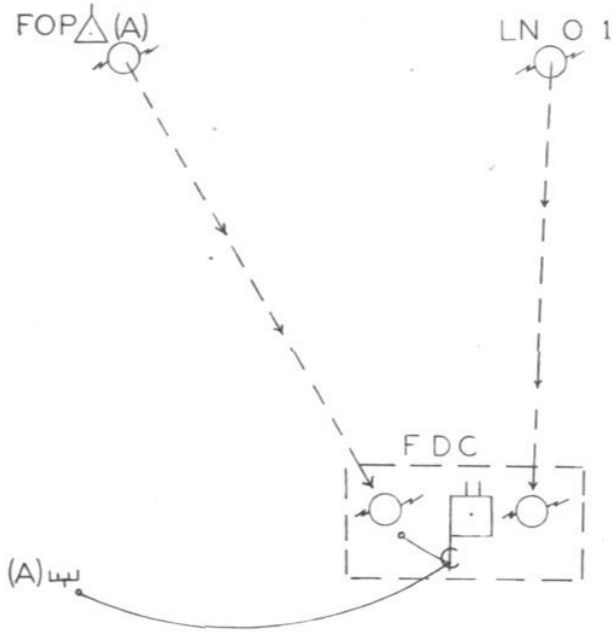

Figure II

B and C Batteries with the remainder of headquarters move into position. Radio communication is immediately established with the fire-direction center. Fire of the entire battalion can now be directed by the forward observer of A Battery or the two liaison officers. The radio net is now as shown in Figure 3.

When wire communication is established with B and C Batteries, the sets at their respective gun positions shut down. Radio communication with B and C Battery forward observers is then established by the fire-direction center. The SCR-194 radio net is complete as shown in Figure 4.

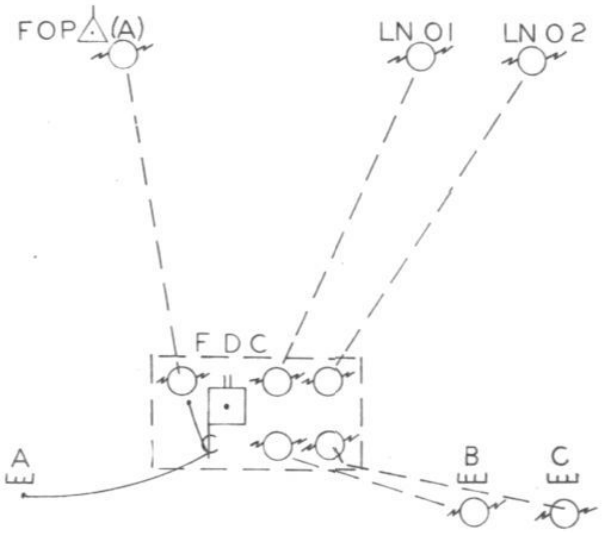

Figure III

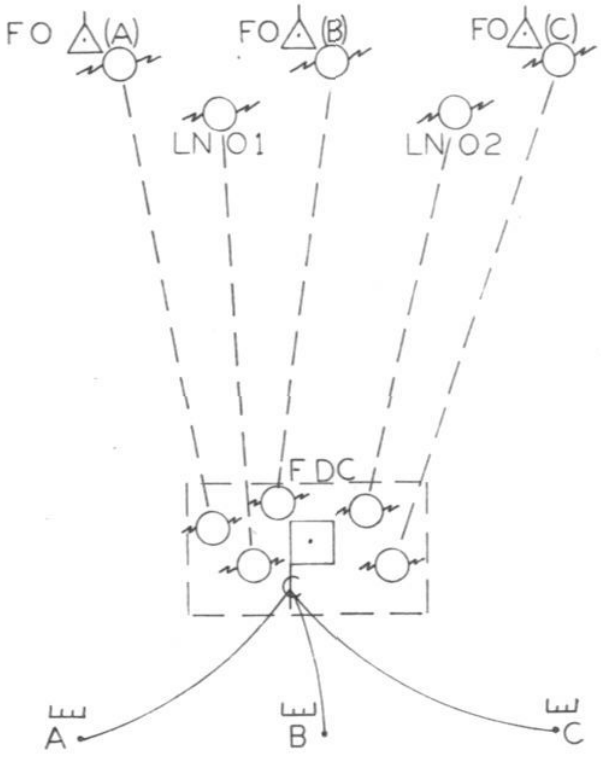

Figure IV

In case the battalion commander desires a forward observer to fire his battery at targets of opportunity, or for any other reason to decentralize control, the set at the guns is instructed to begin operation. In this case the set at the fire-direction center, after informing the forward observation post, shuts down. The forward observer can then fire his battery directly.

Obviously, radio operators must be dependable and thoroughly trained to make this net function. It will be found advantageous to have the operators of each net

habitually work together to achieve the maximum co-ordination.

However, as a complication to the problem, three sets can sometimes be operated simultaneously on the same frequency. If there is a large enough hill or tree mask between the fire-direction center and the guns, if the distance is greater than fifteen hundred or two thousand yards, or if atmospheric conditions are particularly favorable, the high frequency signals transmitted by the receivers at the gun position and the fire-direction center will not block reception of the forward observation post transmissions. Operators must be trained to recognize and take advantage of this situation.

Not only must the operators be well trained, but also the officers. The SCR-194 set has certain very definite operating limitations. If the officer using the set is not thoroughly familiar with these limitations, poor communication, or none at all, will result, as the enlisted operator may, in deference to rank, permit the set to be operated under unsuitable conditions. In addition, the officers should be capable of operating the set in case the regular operator becomes a casualty.

No mention has been made of the third SCR-194 in each battery. Since five frequencies are the normal allotment of a light battalion, and these are used by the three battery nets and the two liaison nets, no separate net can be set up, but many uses will be found for the third set: to act as a relay station, to provide leap frog observation posts, to provide communication between the battery commander and executive, and to serve as a replacement for the other sets.

When the wire net in the situation previously discussed is complete, it is as shown in Figure 5. This net must be regarded as ideal under ideal circumstances, but under less favorable conditions it is often unattainable and sometimes not desirable. The system which should be installed for any given situation is the one which will best meet the requirements of that situation. Any number of variations from this basic wire net can be adopted to conform to the situation, and thus speed installation and meet requirements.

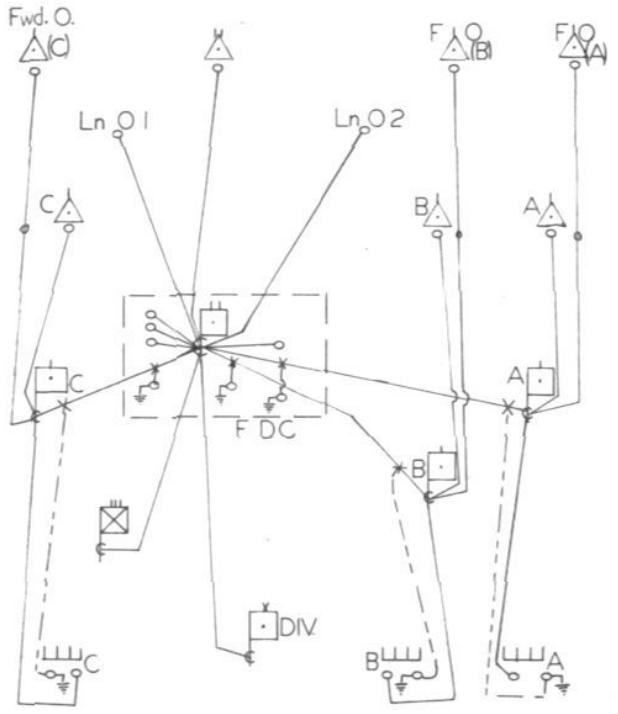

Figure V

For example, assume that radio silence has been imposed and rapid centralization of fire control is desired. The wire net shown in Figure 6 can be installed rapidly and will fulfill all requirements. Lines from the battalion switchboard to the forward observers and from the fire-direction center to the gun positions are laid by the respective batteries, while the wire trucks of the battalion are employed in laying lines to the liaison sections. Installation is further speeded by eliminating all but the battalion switchboard. This net has the further advantage of providing quick and easy coordination between observation posts, as only one switchboard is involved in calls between them, whereas with the conventional net a call between observation posts must be routed through three switchboards. Mutual identification of targets permits their accurate location by the observers, and thus the battalion commander is aided in achieving the maximum degree of surprise with the fire power of his battalion.

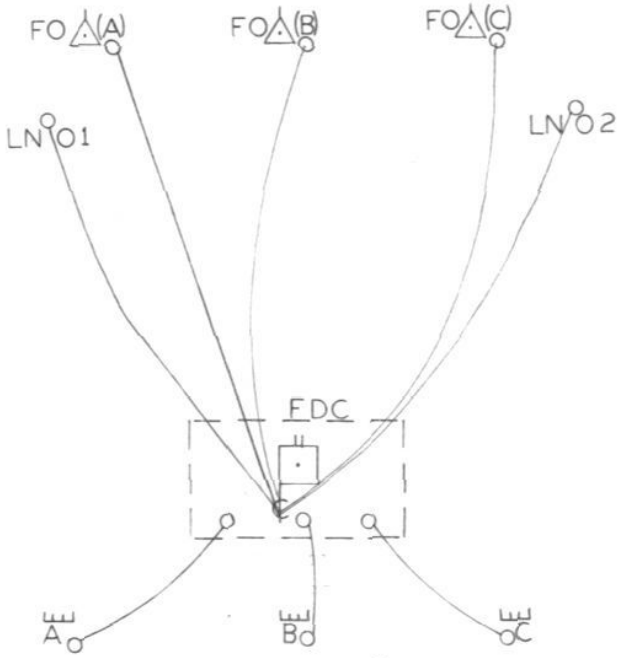

Figure VI

This system has the disadvantage of preventing ready decentralization of fire control functions. However, this too could be accomplished by lifting the radio silence. In any case, the wire net should be improved as rapidly as time permits.

Speed in establishing wire communication can often be increased by making use of gun battery wire, equipment, and personnel, as shown in the last example. Battery wire sections should be considered as a pool upon which the communication officer can draw whenever it is advantageous to the communications of the battalion as a whole.

As a further illustration, when the three gun batteries take positions in a line with the battalion command post on one flank, if the gun batteries are required to lay lateral lines communication can be established with all by laying one line from the battalion command post to the nearest gun battery. With the line simplexed between headquarters battery switchboard and that of Battery A, and with radio communication between the fire-direction center and C guns, the entire battalion may be fired by A and B Battery observers. Of course, this system is also improved as time permits. See Figure 7.

Location of the battalion command post with respect to the batteries determines the length of the lines that must be laid, and consequently the time required to lay them. Habitually placing the artillery command post near that of the infantry places an undue strain on the wire sections. It is much easier, and faster, to lay three short lines to the batteries and one long line to the infantry command post than to lay three long lines to the batteries and one short line to the infantry. If the location of the command post is chosen with these factors in mind, time and wire will often be saved. Wire should be hoarded and conserved. It is almost as valuable to the battalion commander as ammunition, and like ammunition, there is rarely enough and never too much.

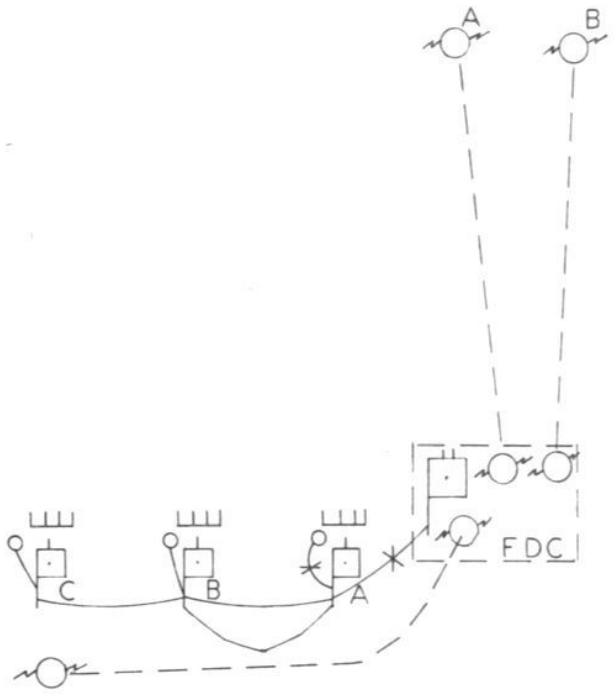

Figure VII

Reports from the present European war indicate that radio communication, because of interference, has frequently failed completely. Too great dependence should not be placed on radio and we should be prepared to function at any time without it, though obviously its absence would be a severe handicap. Radio should be considered as a secondary means of communication, highly useful and important when it can be used.

CHECK UP BEFORE FAST CHARGING

Whatever else fast chargers are, they're not foolproof. You're playing with a lot of current and if you don't follow instructions exactly, you'll ruin the battery.

The recommended procedure must be followed accurately. It includes careful hydrometer and thermometer readings with electrolyte at proper level. (A half inch above the top of the plates.)

Poor hydrometers have caused some trouble in setting chargers for the proper charge. The average battery hydrometer reads only as low as 1140. When the hydrometer fails to float, the only thing that you know is the specific gravity of the battery is below 1140. Since some batteries have a specific gravity considerably below that, and since the charging time is based on specific gravity, it is impossible to determine the setting. Hydrometers for fast chargers must read as low as 1060 to be any good.

If the time on charge, which is based on specific gravity, is not correctly set, one of two things will happen. If the fast charger is set for too short a time the battery will not get as much of a charge as it should. The result is exactly the same as if it were taken off a slow charger too soon. If the charger is set for too long a time the battery will get the fast charge for too long a period, which will result in excessive gassing.

Excessive gassing itself is an indication that much of the current you are putting into the battery is being wasted. Instead of being stored it is being used to separate the electrolyte chemically and turn it into a gas. When this happens, it is possible to waste as much as 90 per cent of the current going into a battery. So you see, accurate hydrometer readings are necessary if the fast chargers are to do their job.—*Army Motors*.