

ARMOR COMMAND VEHICLE RADIOS

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SUBJECT: Armor Command Vehicle Radios

1. PROBLEM. To determine whether command vehicles in armor and armored cavalry units should be equipped with two receiver-transmitter radios.

2. ASSUMPTIONS.

a. Current tactical communications doctrine as taught by service schools and described in Army field manuals will not change in the near future.

b. New radios with double or multiple receiver-transmitter capability will not be in the Army inventory in the near future.

c. Funds will be available to purchase additional radios.

3. FACTS BEARING ON THE PROBLEM.

a. Current tables of organization and equipment authorize only one radio set, the Army Navy/Vehicular Radio Communications-12 (the AN/VRC-12), in armor and armored cavalry command vehicles. (Annex A, 15:10, and 1:236,240)

b. Commanders at all echelons are required to be in two radio nets at all times. (8:17)

c. Tactical commanders require responsive and flexible signal communications to adequately control the fighting forces under their command. (Annex A, Annex C, and 9:para 2-1)

d. One fundamental of good communications is to plan for a reserve means of communications. (6:para 24-2 and 9:para 3-14c)

e. Many commanders in Vietnam have made extensive use of two receiver-transmitters in their command vehicles. (Annex C and Annex D)

4. DISCUSSION.

a. Two receiver-transmitters fulfill the two-channel requirement better than the AN/VRC-12. The AN/VRC-12 receives two channels at one time, but it can transmit on only one frequency at a time. Any combination of two receiver-transmitters can receive and transmit on two channels simultaneously. (Annex A)

b. Additional speed, responsiveness, and flexibility of communications would be gained with two receiver-transmitters in command vehicles. (Annex A)

c. Manual changing of frequencies would be eliminated by using two receiver-transmitters. Safety on moving armored vehicles would be enhanced, and the commander would never have to lose eye contact with the situation on the ground. (Annex A)

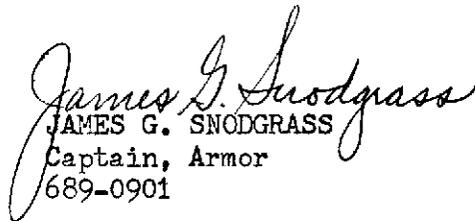
d. Unlike the AN/VRC-12, two receiver-transmitters of the AN/VRC-12 series of radios provide the commander with an inherent, reserve transmitting capability. This capability would be long range. (Annex A)

e. Although more space is required for the installation of two receiver-transmitters, this space is currently available in all armor and armored cavalry command vehicles. (Annex A)

f. Cost comparison contains apparent discrepancies and should not be prohibitive to the installation of two receiver-transmitters in armor command vehicles. Cost economy should not be an overriding consideration. (Annex A)(Annex B)

5. CONCLUSION. All armor and armored cavalry command vehicles should be equipped with two receiver-transmitter radios.

6. ACTION RECOMMENDED. Department of the Army should procure additional radios and change current armor and armored cavalry tables of organization and equipment to reflect two receiver-transmitter radios for all command vehicles.

  
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ANNEXES: A - Detailed Discussion  
B - Cost Comparison between the AN/VRC-12 and the AN/VRC-49  
C - Personal Opinion and Personal Experience in Vietnam  
D - Experience of Others  
E - Bibliography

CONCURRENCES: (Omitted)  
NONCONCURRENCES: (Omitted)  
CONSIDERATION OF NONCONCURRENCES: (Omitted)  
ANNEXES ADDED: (Omitted)  
ACTION BY APPROVING AUTHORITY:

DATE:

Approved (disapproved), including (excluding) exceptions.

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Signature

## ANNEX A - Detailed Discussion

1. The AN/VRC-12: The current radio authorized for command vehicles in armor and armored cavalry units is the AN/VRC-12. Basic major components of the AN/VRC-12 are one receiver-transmitter (RT-246) and one auxiliary receiver (R-442). This radio set allows simultaneous monitoring of two channels and transmission on one channel. Frequencies may be changed on the RT-246 by pushbutton tuning or by remote selector control sets. Ten frequencies may be preset on the RT-246. (10:4-12)

2. The two-channel requirement: All commanders of armor and armored cavalry units are required to operate in two radio nets at all times. (8:17) Combat often requires instantaneous communication on two radio nets simultaneously. Normal usage of the AN/VRC-12 dictates that the RT-246 is set on the commander's own frequency for command and control of his unit. The R-442 is set on the frequency of the next higher command.

3. Advantages of the AN/VRC-12.

a. Ten frequencies may be preset on the RT-246. (10:4-12) In combat, for example, fire support frequencies, the medical evacuation frequency, and adjacent unit frequencies could be preset in addition to a commander's own and immediate higher command frequency.

b. Frequencies may be changed by pushbutton tuning on the RT-246. (10:4-12) This is a time-saving capability which eliminates the need to manually change frequencies, a drawback of other receiver-transmitters.

c. Two channels may be monitored simultaneously, thus fulfilling the requirement to operate in two radio nets at all times. (10:4-12)

d. The AN/VRC-12 has a relatively long range receiving and transmitting capability. Planning ranges are 25 kilometers when moving and 32 kilometers when stationary. (10:4-3) Even though this radio is capable of longer ranges than normally needed by platoon leaders and company commanders, it is good planning to have a capability more powerful than minimally needed at any time.

e. Some vehicles are equipped with frequency selector control sets which change frequencies on the RT-246 by remote control. (16:4-14) These sets are located in the cupola of the vehicle and eliminate the need to climb down into the vehicle to push buttons on the RT-246.

f. The AN/VRC-12 aids commanders who cannot readily get to the radio controls. This was one of the main reasons for the development of the pushbutton radio. (10:4-12) Recoiling main guns and bumpy terrain often make it difficult to manually change frequencies.

g. The AN/VRC-12 requires less space than any combination of two receiver-transmitters of the AN/VRC-12 series of radios. Space inside armored vehicles is usually less than desired by the soldiers who have to operate and live in the vehicles.

h. If purchased as whole sets, the AN/VRC-12 costs less than combinations of two receiver-transmitters of the AN/VRC-12 series of radios. (Annex B and 2:8190,8191)

#### 4. Disadvantages of the AN/VRC-12.

a. The AN/VRC-12 allows transmission on only one channel at a time. (10:4-12) The two-channel requirement is fulfilled only by reception of two frequencies simultaneously.

b. Frequencies on the auxiliary receiver must be changed manually. (10:4-7) When changing from one frequency to another on the AN/VRC-12, a commander must climb down into the vehicle to push the correct button on the RT-246. In order not to have both the RT-246 and the R-442 on the same frequency, thereby losing communications with either his own unit or his next higher commander, he must change the frequency on the R-442. The time gained in having only to push a button on the RT-246 is lost by having to manually change the R-442. The two-channel requirement cannot be fulfilled unless the frequency on the auxiliary receiver is manually changed. Commanders who have frequency selector control sets must also climb down into the vehicle to manually change the R-442 or lose their two-channel capability.

c. Safety on the vehicle is lessened, especially while moving, when the commander must climb down into the vehicle to manually change frequencies on the R-442 or push buttons on the RT-246. (11:2)

d. The commander loses eye contact with the situation on the ground when he must climb down inside the vehicle to change frequencies. (11:2)

e. There is no reserve transmitting capability with the AN/VRC-12. (10:4-12) If a malfunction occurs in the RT-246, the commander cannot transmit on any frequency. He would have to procure another receiver-transmitter or exchange vehicles with another commander. Both of these alternatives would be difficult to do if engaged in combat.

f. Higher commanders sometimes enter lower commanders' nets in order to receive an immediate response. This is done because the higher commander knows that the lower commander must change frequencies, thereby losing response time. This is not desirable and can create confusion.

5. Advantages of two receiver-transmitters of the AN/VRC-12 series of radios. (Example: the AN/VRC-49)

a. The commander will be able to monitor and to transmit at long range on either of two frequencies at the same time. (10:4-18) This capability fulfills the two-channel requirement better than the AN/VRC-12.

b. No manual changing of frequencies is required. The commander will always be able to transmit on both required nets. (10:4-18)

c. Safety on the vehicle would be enhanced. The commander would not have to climb down inside a moving vehicle to change frequencies. (11:2)

d. The commander would never have to lose eye contact with the situation on the ground. (11:2)

e. Response to incoming calls on either net would be instantaneous. Higher commanders, knowing the lower commander had a double transmitting capability, would have no need to enter the lower commander's net. The speed and flexibility of communications within a unit would be greatly increased with two receiver-transmitters.

f. When using two receiver-transmitters of the AN/VRC-12 series of radios, the commander would always have an inherent, reserve transmitting capability. This capability would be long range. Good commanders plan for reserve means of communication. (6:para 24-2 and 9:para 3-14c)

g. Two receiver-transmitters would aid commanders who cannot readily get to the radio controls. The commander would never have to concern himself with frequency changes, thereby freeing him to concern himself with more important aspects of a combat situation.

h. The AN/VRC-49, for example, costs less than the AN/VRC-12 if component parts are purchased individually. (Annex B and 2:8190,8191)

6. Disadvantages of two receiver-transmitters of the AN/VRC-12 series of radios. (Example: the AN/VRC-49)

a. More space within the vehicle is required for installation of two receiver-transmitters. Approximately one additional foot (twelve inches) of space would be required to mount the combination of two receiver-transmitters. (16:4-12)

b. Two receiver-transmitters of the AN/VRC-12 series of radios would cost more than an AN/VRC-12 if the radios were purchased as whole sets. (Annex B and 2:8190,8191)

## 7. Comparison of advantages and disadvantages.

a. Two receiver-transmitters fulfill the two-channel requirement better than the AN/VRC-12. The AN/VRC-12 receives two channels at one time, but it can transmit on only one frequency at a time. Any combination of two receiver-transmitters can receive and transmit on two channels simultaneously.

b. Additional speed, responsiveness, and flexibility of communications would be gained with two receiver-transmitters in command vehicles.

c. Manual changing of frequencies would be eliminated by using two receiver-transmitters. Safety on moving armored vehicles would be enhanced, and the commander would never have to lose eye contact with the situation on the ground.

d. Unlike the AN/VRC-12, two receiver-transmitters of the AN/VRC-12 series of radios provide the commander with an inherent, reserve transmitting capability. This capability would be long range.

e. Although more space is required for the installation of two receiver-transmitters, this space is currently available in all armor and armored cavalry command vehicles.

f. Cost comparison contains apparent discrepancies and should not be prohibitive to the installation of two receiver-transmitters in armor command vehicles. Cost economy should not be an overriding consideration. A commander's effectiveness on the battlefield should be the paramount consideration in any decision regarding radio configurations for command vehicles.

## 8. Other Considerations.

a. Some people may argue that to install the AN/VRC-49, for example, would double communications maintenance problems. In reality, the same problems would remain: lack of training of personnel, improper operation, and typical mechanical malfunctions. However, the commander would have greater probability of maintaining adequate communications with the double transmitting capability and inherent, reserve communications.

b. There is no requirement in armor doctrine for any field commander to need ten preset frequencies. Rarely are more than two channels required at any time.

c. Any combination of two receiver-transmitters would fulfill the two-channel requirement better than the AN/VRC-12. However, radios of the AN/PRC-25 series would not have long range capability. The AN/VRC-49 is used in this study as perhaps the best radio combination for field armor commanders.

ANNEX B - Cost Comparison between the AN/VRC-12 and the AN/VRC-49.

1. Approximate cost if component parts are purchased individually:

a. AN/VRC-12	RT-246	\$2,618.00
	MT-1029	40.00
	R-442	587.00
	MT-1898	36.00
	AS-1729	271.00
	Installation kit	<u>(approx) 50.00</u>
		\$3,602.00

b. AN/VRC-49	RT-524 (2)	\$2,659.46
	MT-1029 (2)	80.00
	AS-1729 (2)	542.00
	Installation kit	<u>(approx) 100.00</u>
		\$3,381.46

c. The AN/VRC-12 costs \$760.58 more than the AN/VRC-49 if the radios are purchased as whole sets. If component parts are purchased individually, the AN/VRC-49 would cost approximately \$220.00 less than the AN/VRC-12. (2:8190,8191) These apparent cost discrepancies could not be explained by Warrant Officers Addison and Phillips, supply officers of the Communications-Electronics Department of the United States Army Infantry School.

## ANNEX C - Personal Opinion and Personal Experience in Vietnam

I spent my tour in Vietnam with the 1st Squadron, 11th Armored Cavalry Regiment. All Commanders I knew there either had or tried to have their armor command vehicles equipped with a minimum of two receiver-transmitter radios. I personally commanded a platoon with one RT-246 and one RT-524 with an AN/PRC-77 as reserve and dismounted communications. Never was I without effective communications. Having gone through field training at Fort Bragg, North Carolina, I knew the disadvantages of the authorized single receiver-transmitter radio set.

I am a believer in excellent and adequate communications. Modern battlefields provide and will continue to provide fast moving situations, especially on initial contact. "As the tempo of battle increases and as modern weapons prove more destructive, communications become even more important." (3:12) "Command and communications are inseparable. Little command can be exercised without effective communications." (7:44) "Communications must be facilitated to the same degree as is the accomplishment of the mission." (5:38)

The requirement to be in two radio nets simultaneously was the overriding factor influencing the nature of communications equipment in my unit in Vietnam. It would have been harassing and tactically unsound to have constantly changed frequencies while on operation. The 11th Armored Cavalry Regiment used radios to the maximum extent while on operation. Higher commanders required instantaneous response to calls from them. Communications was especially critical during firefights. We commanders did everything within our capabilities to augment the number of authorized radio sets in our unit to allow the configurations believed necessary for constant, instantaneous, and responsive command and control.

By always maintaining outstanding communications, my confidence was buoyed and I only had to concern myself with other aspects of the battlefield situation. Any way to help the commander in the field do his job more efficiently must be a relevant concern and consideration.

ANNEX D - Experience of Others.

There are other armor officers here at the Infantry School who had similar experience in Vietnam. CPT Paul Renschen used an AN/VRC-12 and an AN/VRC-46 throughout his time as a troop commander. CPT Lee Fulmer, CPT Paul Kern, and CPT E.G. Fish each used two receiver-transmitters of various configurations. CPT Jim Vance and CPT Joe Scates used an AN/VRC-47 and AN/VRC-12 respectively, but each has expressed preference for two receiver-transmitters if available. CPT Scates stated that the pushbutton RT-246 is excellent, but only rarely are more than two channels needed.

It is fairly common knowledge that airborne (helicopter) commanders in Vietnam frequently employed more than their normal authorized radio configuration. As a minimum, these commanders employed two receiver-transmitters. They found it necessary in order to maintain effective command and control. (12:8-9)

Even the Russians after World War II were believers in two receiver-transmitters per command vehicle. "The characteristic peculiarity of our brigade is the heavy saturation of all sections with radio facilities. Even my tank, the tank of the brigade commander and those of the unit commanders had two radio stations."  
(4:3)



ANNEX E - Bibliography

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UNITED STATES ARMY INFANTRY SCHOOL  
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Fort Benning, Georgia 31905

ATSIN-L

17 November 1970

MEMORANDUM FOR: DIRECTOR, LEADERSHIP DEPARTMENT

SUBJECT: Classified Information

1. This memo has been read and signed by the content evaluator, a person with expertise in the subject area.
2. To the best of my knowledge, this staff study/~~monograph~~ (Roster number 153 IOAC 1 -70) contains no classified information, and in the opinion of the undersigned requires no classification IAW AR 380-5.

JAMES W RITTER  
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