



# Communications for the modern battlefield

by Maj. Carl E. Schell

As the Army moves toward a more technologically sophisticated battlefield, so do our potential adversaries. For our commanders to be successful in this environment, command and control communications must become more reliable, more flexible and less susceptible to enemy electronic countermeasures. Currently, the primary means of communications on the battlefield will remain the VHF-FM combat net radio. To meet this challenge and provide the battlefield commander with the capability to communicate in a modern threat environment, the Army has developed the Single Channel Ground and Airborne Radio Subsystem (SINGGARS).

As early as 1964, the Army began looking for a replacement for the AN/VRC-12 family of radios. Early goals were optimistic and consisted of developing a single radio that would be used as a building block for both FM and AM communications. This would be accompanied through a series of plug-in modules that could be changed to provide a variety of capabilities. This radio would also be small, lightweight and reliable. As requirements changed and technology advanced, it became evident that more was needed in a combat net radio. It needed to be able to pass data, it had to have more usable channels and it had to be able to counter the advances that were being made in the field of communication jamming. As a result, the Army began the development of SINGGARS in 1974.

Besides those early requirements to produce a radio that was smaller, lighter and more reliable, SINGGARS also had to have other capabilities. The radio had to be capable of supporting all of the Army's current and future command, fire control and data systems, and it had to do it in a secure mode. It had to provide more usable channels to support increased information flow. It had to counter communications degradation anticipated by the enemy use of electronic countermeasures, and it had to do all of this while

reducing maintenance requirements and life cycle cost. The radio that does all this is just around the corner. The SINGGARS family of radios is undergoing its final stages of operational assessment, and the first production radios will be fielded in the first quarter of FY86.

This new radio meets all of the requirements set for it. It is much smaller than the current AN/VRC-12 series of radios. In fact, two SINGGARS radios can fit in the same amount of space taken by one AN/VRC-46. It is also much lighter. The manpacked SINGGARS radio with secure equipment weighs only 22 pounds as compared to 60 pounds for a comparably equipped AN/PRC-77. This savings in both size and weight allows SINGGARS to give the battlefield commander increased capabilities without reducing the limited amount of usable space in combat and tactical vehicles or loading down his soldiers with an additional burden when used in the manpacked configuration.

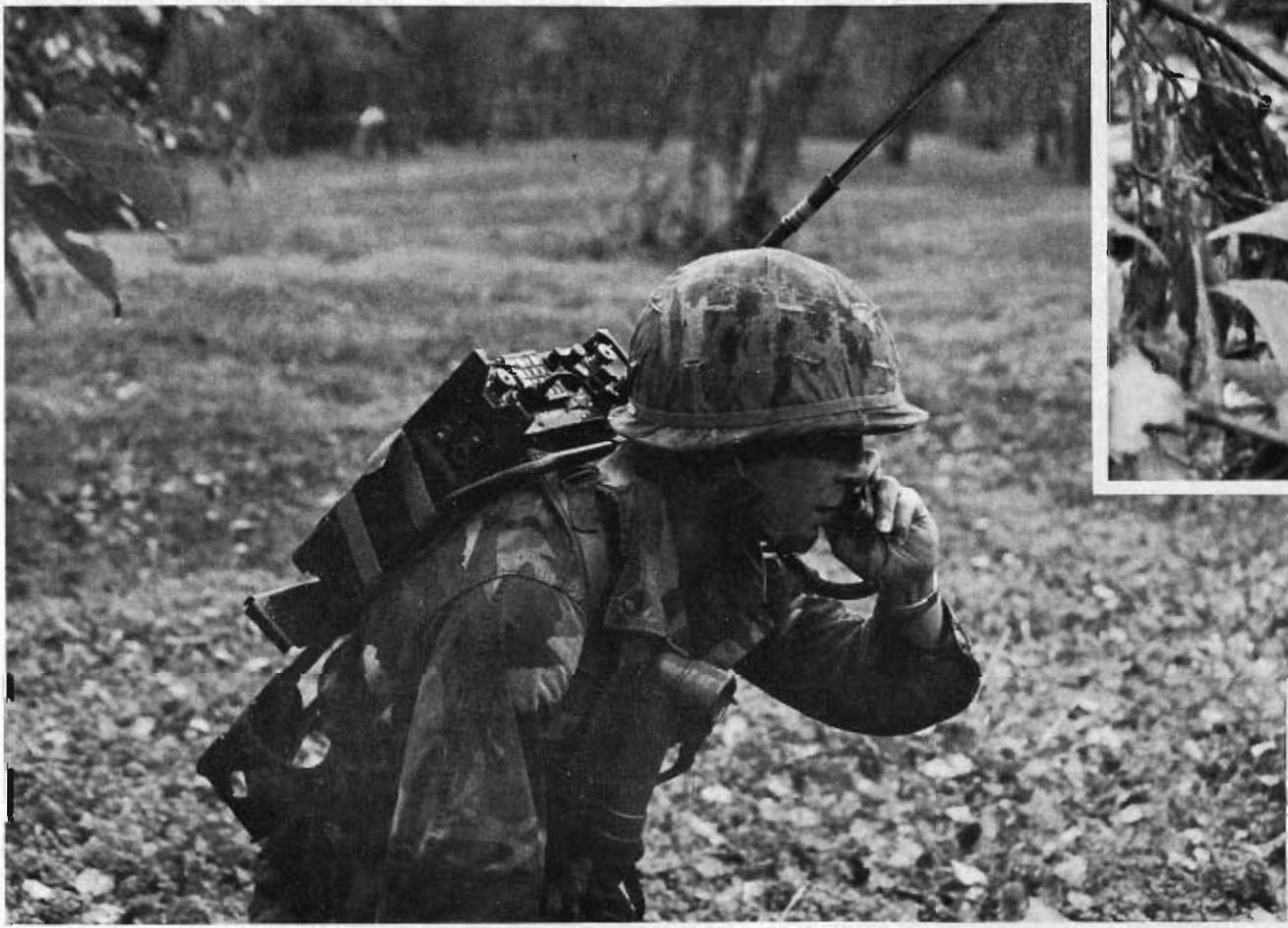
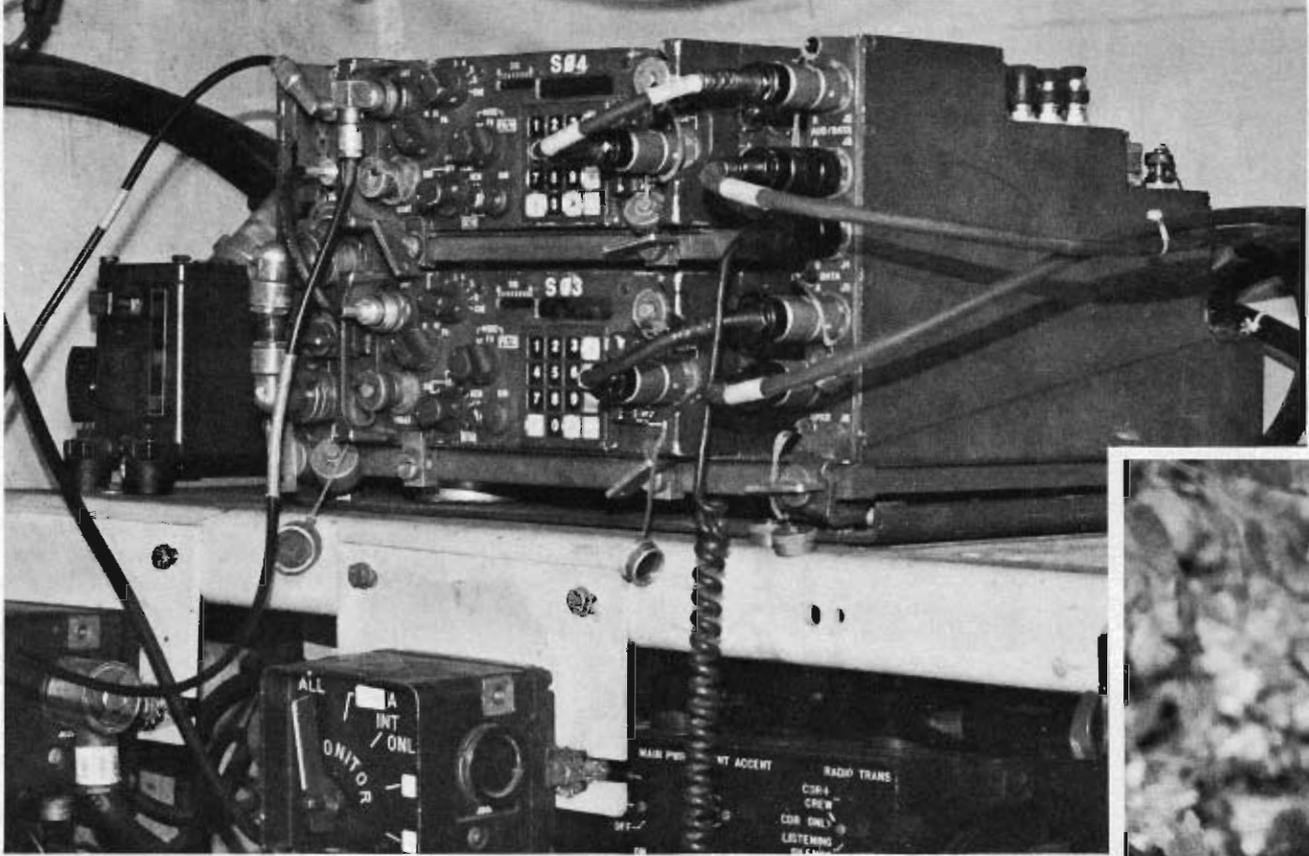
SINGGARS also provides more usable channels to support the constantly increasing flow of information on the battlefield. This is accomplished in two ways. First, the SINGGARS radio operates in a slightly expanded frequency range of 30-88 MHz as compared to the 30-76 MHz for the AN/VRC-12. The second method is to reduce channel spacing from 50 KHz to 25 KHz.

Together these methods provide 2320 available communications channels as compared to the 920 channels we now have. The operator also has the capability of presetting six channels into the radio, so that he can change from one radio net to another with the push of a button in much the same manner as he would a car radio or home stereo. These six channels can also be scanned simultaneously to allow the operator to monitor all six nets.

Besides the capability to handle the increased flow of information on the battlefield by increasing the number of

*SINGGARS is smaller, lighter and more reliable than the old AN/VRC-12 radios. It can support all of the Army's current and future command, fire control and data systems; and it can provide more useable channels. Further, it can counter communications degradation and it is cost effective. It will be fielded in the first quarter of FY 86. (US Army photos)*







*SINCGARS can handle both voice and data. It has a built-in capability to handle data at a rate of 16 kilobits. With the available data rate adaptor, it can also handle standard data rates from 75 to 4800 baud. (US Army photos)*

available channels, SINCGARS also has the capability to handle both voice and data. The SINCGARS radio has a built-in capability to handle data at a rate of 16 kilobits. With the available data rate adapter, the SINCGARS radio is also capable of handling all standard data rates from 75 to 4800 baud. This data rate adapter also has the capability to convert analogue data to low rate digital data for error control. It can also identify data vs voice traffic in order to provide mode control for ancillary devices. This data capability helps open a new world of information possibilities to the small unit commander.

One of the more interesting unique capabilities of SINCGARS is its built-in capability to provide electronic counter countermeasures (ECCM) across the battlefield. This is done through a method known as frequency hopping. When operating in the frequency hopping mode, the SINCGARS radio hops on any designated number of channels up to 2320 at a rate of approximately 100 hops per second. This hopping, or rapid frequency changing, is accomplished simultaneously by all of the radios in a net without any loss of traffic information. The hopping sequence is random in order to provide security from enemy jamming or monitoring. The information required to place the radio in the frequency hopping mode can be placed in the radio by the operator or can be transmitted to the radio electronically from another radio in the net. This allows outside stations to enter a radio net at the discretion of the net control station even though they may not have all of the necessary net information to place their radio in the frequency hopping mode. As SINCGARS is fielded, frequency hopping will become the standard method of operation with radios only rarely operating in the single channel mode.

Besides improved operations on the modern battlefield, the SINCGARS radio has been designed to be easier to maintain. It replaces the current family of radios using a single RT unit, which is slightly smaller than the current RT-841 used in the PRC-77. From this basic RT unit, the SINCGARS comes in seven configurations, all using common components. This allows components to be readily available.

Unit maintenance will consist of fault-isolation to the Line Replaceable Unit (LRU) (RT, power amplifier, antenna, for example). Once the faulty LRU is identified, it is returned to the Intermediate Forward level of maintenance. Here the Shop Replaceable Unit (SRU) is identified and replaced. The LRU is then returned to operation, and the faulty SRU is evacuated to Intermediate Rear where selected SRUs are repaired and others are returned for depot level maintenance. The entire SINCGARS system was designed to provide rapid fault isolation and repair.

SINCGARS has even more to offer. The radio has three power output levels built into it: low, medium and high with planning ranges of 300 meters, four kilometers and eight kilometers respectively. When mounted on a vehicle, a power amplifier can be added to provide a planning range of 35 kilometers. The radio is also equipped with a transmit/receive signal strength indicator so that the operator can insure he is obtaining the maximum desired signal strength. When used in the single channel mode, the radio has the additional capability of offset tuning which allows the operator to fine tune the radio plus or minus five or 10 KHz for better operation. The radio also comes equipped with a battery life indicator to prevent disruption in communications due to a dead battery. When silence is important, the radio can be operated in the "whisper" mode which allows the operator to speak quietly into the handset and still be received with maximum volume at the distant station. And of course, the SINCGARS radio is compatible with the AN/VRC-12 equipment when operated in the single channel mode. All of this plus uniformity of design make SINCGARS a valuable tool in support of modern battlefield operations.

SINCGARS gives the commander on the battlefield of today and tomorrow a secure, reliable and flexible means of both data and voice communications which will allow him to make maximum use of the modern technology during combat, combat support and combat service support operations.

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