Enough power to do the Job

by Maj. John J. Keane, Jr.

The number of articles written recently on the subject of tactical generator systems have provided the battalions in the field with an excellent source of training material to accomplish the mission of training our soldiers on the proper way to utilize the communications system's associated power source. The articles did not address, however, one of the underlying problems with tactical power systems for division communications systems: the question of how much power should be provided for each system. The purpose of this article, therefore, is to take a look at the solution developed in USAREUR to provide an adequate power source that allows the division signal battalion to perform its mission of providing continuous, reliable communications for the division commander. A second purpose is to address the question of maintenance including the capability of the maintenance system to sustain the power generating capability of the division signal battalion.

This is not another attempt to justify the requirement for large generators for the division signal battalion. In fact, I am opposed to using large generators to power a signal center, and I do not see the need for 30 KW, 45 KW or 60 KW generators. Having served as the company commander of both A and C companies of a division signal battalion as well as the S-3 and ADSO, I have had experience with both methods of powering large signal centers. My experience has been that the use of large generators inevitably leads to neglect of the smaller organic generators of the individual communications systems. So much emphasis is placed on maintaining the large power source that training of the team chief and the members of the team on their assigned generator is forgotten. When the large power source

fails, there are excessive delays in activating the smaller power sources due to lack of maintenance and operator training. The argument usually employed for larger power sources is the lack of reserve power to insure continuous operations in the event of the loss of the organic power source. The argument is completely valid, but the solution of providing large capacity power sources has a number of deficiencies.

The solution found by USAREUR division signal battalions was to increase the size of the organic generator authorized for each system so that each power source had the capability to power two systems instead of one. Other benefits were accrued that contributed to the overall efficiency of the signal battalion's operation and allowed it to provide continuous, reliable communications. The success of this concept has been demonstrated on numerous field exercises and in training the soldiers of the battalion. In spite of opposition by agencies responsible for providing power sources for tactical communications, the use of a slightly larger capacity generator for these systems has proven to be the most tactically responsive means of insuring sustained, continuous communications. The USAREUR concept points the way for future systems development and should not be ignored.

To understand completely the USAREUR approach to powering division signal battalion systems, it is necessary to take a look at the power problems that faced the signal battalion as late as November 1978. Until this time, USAREUR division signal battalions were authorized a mixture of 3 KW, 5 KW and 10 KW generators. The 3 KW generators were authorized for all multichannel systems, patch panels, comm centers and most switchboards. The 5 KW generators were authorized for RATT sets and the 10 KW generators were authorized for repair facilities and the large comm centers and switchboards. Those familiar with the base TOE for the division signal battalion (TOE 11-35H) will recognize this as the TOE authorization for generators. Unfortunately, this authorization proved to be the worst for providing reliable, continuous communications for the division. During the first few exercises that I served as the S-3, I noticed that we were experiencing sustained communications systems outages due to generator failure. The problems were caused because when our 3 KW generators failed due to maintenance problems, we were unable to provide immediate back-up power to bring the system up on the air. The 3 KW generator was just large enough to power the system it was authorized for and offered no capability to slave other systems. Unless a displacement system was available on site, the only way to solve the problem was to move a generator from another site. During these early exercises, I spent as much time directing the movement of power sources between sites as I spent engineering the communications system and troubleshooting communications problems. The quality of service provided to division subscribers was totally unsatisfactory and it was due to the inability of the 3 KW generator to serve as a reliable power source. It is impossible for the division signal battalion to provide the continuous, reliable communications the division commander needs with an unreliable power source. The signal battalion cannot be provided a generator whose loss also causes the loss of the communications system.

The solution to the problem was to change the USAREUR division signal battalion MTOE to reflect a 5 KW generator for communications systems previously authorized a 3 KW generator. Before I even begin to discuss the operational aspects of the change, I would like to point out several other benefits that were realized.

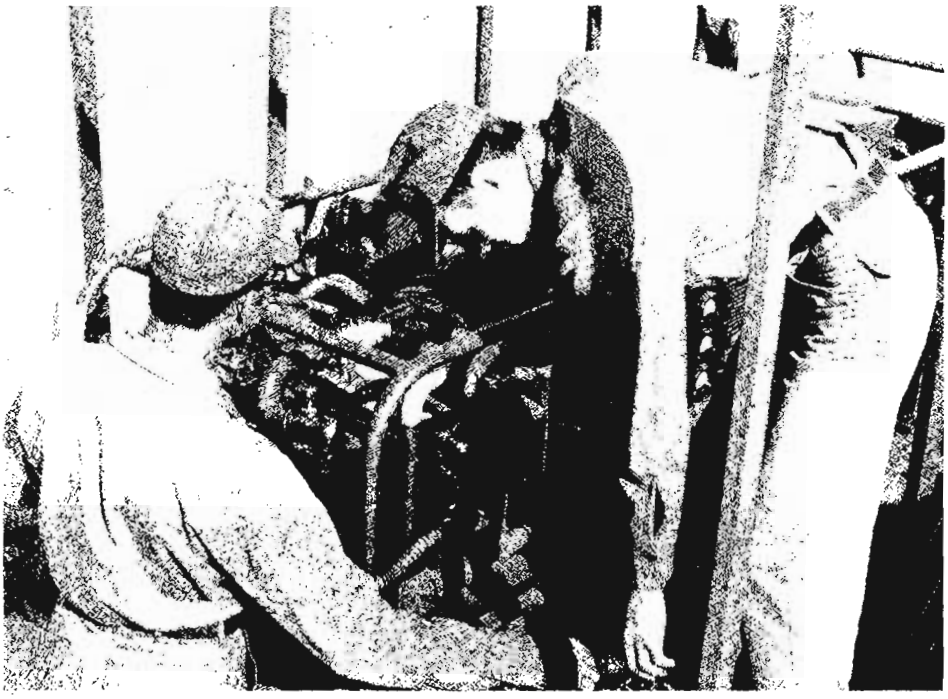
After the MTOE change was approved, the total number of AC generator types authorized to the battalion was reduced from 8 to 3. The battalion now has 101 5 KW PU-620 sets, ten 5 KW PU-618 sets and ten 10 KW PU-619 sets. Since the PU-620 and the PU-618 are identical generators on different trailers, the net effect of the change was to reduce the number of different power sets to just two. This contributed to a greatly simplified PLL for the units to maintain and a much easier and more effective maintenance training program to be established for repair personnel. As an example, the Forward Communications Company of the Division Signal Battalion in USAREUR is now equipped with one 3 KW DC generator and 36 5KW PU-620 generators. The ability of the Forward Communications Company to perform its mission has been enhanced greatly by the standardization of equipment.

With one standard generator system in the battalion, the problem of training the soldier to operate his/her assigned power source has been greatly simplified. The chief of staff has expressed his concern recently about re-emphasizing the teaching of basic skills to the soldier. Now the teaching of power source operation has been made much easier due to standardization. The section chief or platoon sergeant can now teach all the soldiers in the section or platoon how to operate and maintain the power equipment in one session. There is no longer a need to schedule separate classes for RATT, switchboard and PCM operators because of the different types of power sources.

The operational benefits realized as a result of the change were substantial and contributed to the improved support provided by the division signal battalion. As an example, consider the Division Artillery Signal Center of the 3rd Infantry Division and the differences between the TOE solution and the USAREUR solution for powering the communications equipment there. In the 3rd Infantry Division, the Division Artillery Signal Center is provided three AN/TRC-145 terminals during normal field operations. Two terminals are used to terminate systems to other locations and the third terminal is used for a jump or pre-position capability. When the 3 KW generator was the power source, the loss of a generator set required that the set from the jump terminal be used to meet the operational commitment; consequently, there was no jump capability since there was no power source for the third terminal. Due to the frequent failure of the 3 KW generator, this problem arose during most exercises. When the 3 KW generator was replaced by the 5 KW generator, the problem no longer surfaced. If a generator set was lost due to maintenance problems, one 5 KW generator could now provide power for both terminals and the jump terminal was always assured of having a power source. While the non-operational generator set was being repaired, the signal center continued operation and the pre-position capability was retained. Similar conditions existed at other sites and the loss of one generator set no longer produced the type of crisis that resulted with the 3 KW generator.

Tactial power generators

The days of micro-engineering power requirements down to the last milliwatt of power can no longer be tolerated. The power requirements of tactical units require that standardization and reserve power be included as significant factors in determining the final power set provided.



The second operational benefit realized was the increased flexibility now offered at each signal center for powering any available system. The increase to a 5 KW generator allowed transfer of power sources between various systems based upon mission requirements. If the commander decided that it was more important to power all systems at a given site instead of retaining a jump capability, the generator from one of the displacement multichannel systems could now be transferred to a RATT rig or to the switchboard. This degree of flexibility was not available with the 3 KW generator due to the greater power requirements of the RATT rig and the switchboard. The signal officer could now provide the commander a choice of various options for maintaining communications rather than letting the choice be determined by the availability of a generator.

There are still a number of problems that face the tactical communicator with tactical power systems. One problem that even the increase to a 5 KW generator cannot solve is the provision of emergency back-up at the moment of generator failure. This problem has been solved with the AN/TTC-41 switchboard through the design of an internal DC power source that automatically cuts in when the AC source fails. The AC power source is converted to DC through the P-6224 power supply for normal operation, but a 24V battery that can provide up to four hours of operation is also provided in the event of failure of the AC power source. This additional source of power has also proven its value during numerous exercises and should be looked at carefully for inclusion in the development of new systems and for the re-design of existing multichannel systems. The second problem involves responsibility for performing direct support maintenance for division signal battalion generators. With a total density of 111 PU-620 and PU-618 generators out of 151 in a typical USAREUR division, it is ludicrous for the signal battalion to be supported by the maintenance battalion for direct support maintenance of generators. The standard arguments for not allowing the signal battalion to do this (as well as direct support maintenance on its organic communications equipment) usually center on the need to consolidate demand data and expertise at the maintenance battalion as opposed to decentralizing. However, the consolidation leads to the increased cost of evacuating the generator set to a facility that can be up to 45 kilometers away in either garrison or in the field. Since the signal battalion is not authorized sufficient extra cargo vehicles, the vehicle that moves the generator to the direct support facility often turns out to be the pre-position communications system and the services of a communications system is often lost. The original Division-86 study proposed that the division signal battalion perform direct support maintenance on its assigned generators. This idea should be investigated carefully and the capability included as part of any signal unit not just the division signal battalion.

The days of micro-engineering power requirements down to the last milliwatt of power can no longer be tolerated. The power requirements of tactical units require that standardization and reserve power be included as significant factors in determining the final power set provided. The field experience of USAREUR division signal battalions shows the way for future systems development. The return to a 3 KW generator as proposed in the MTOE standardization studies and the Division-86 study will only serve to degrade the support provided and create once again the problems in training and maintenance that have been successfully overcome.

AC

Maj. Keane is presently assigned to the Defense Nuclear Agency. A thirteen-year veteran, he is a 1968 graduate of West Point. He also holds an M.S. in computer science from RPI in Troy, N.Y. and an MBA from Long Island University. He is co-author of "Third Infantry Division Communications" which appeared in the Fall 1981 issue of AC.