Chapter 4
EMPLOYMENT

COMMAND AND CONTROL

The command and support relationships established for employment of engineer prime power units depend on the situation. Command and control during warfighting situations may differ significantly from that during operations short of war.

War

When employed in a TO during war, engineer prime power units are theater engineer asstes. They are normally assigned or attached to the senior engineer headquarters in the theater. As such, they will most likely be employed in a GS role throughout the theater. Based on the policies and priorities of the theater army (TA) commander, the theater engineer determines relative priorities and allocates prime power assets on a task basis. When appropriate, the theater engineer may allocate prime power assets on an area basis and place prime power companies or teams in a DS role to a theater army area command (TAACOM) or to an area support group (ASG).

Short of War

Prime power units can be employed in a variety of different roles in operations short of war. They can be employed to support units conducting operations, to be actual participants in the operations, or both. For example, a prime power unit can provide power to an American facility supporting a nation-assistance effort. On the other hand, it can participate in the operation by providing power or power-related technical assistance and training directly to the host nation. The command and support relationships established will be dependent on the role of prime power units in these operations.

The operational control (OPCON) command relationship is used extensively in the employment of engineer prime power units. Highly specialized Class IV, VII, and IX requirements require deployed companies and teams to maintain working supply channels with the prime power battalion. Companies and teams also depend on the battalion for electrical engineering support and personnel replacement. Regardless of the command and support relationships used, prime power units must rely on the supported unit to provide unit maintenance (less generators) as well as supply, food, health, religious, legal, finance, and personnel administration services. Chapter 5 contains detailed information about logistical requirements.

Nation Assistance

Prime power units can be employed in nation-assistance operations independently or as part of a larger assistance effort. A prime power unit participating in nation-assistance operations with other military units will normally be OPCON to the senior military commander or to the senior engineer commander as appropriate. When operating independently (such as in support of a State Department assistance effort) the prime power unit will normally be OPCON to the chief of the Security Assistance Organization (SAO) for the country being assisted. The chief of the SAO is one of the military representatives on the country team. The country team provides advice and assistance to the ambassador.

Disaster Relief

Disaster-relief operations are separated into two categories—disaster relief to foreign nations and disaster relief in the continental United States (CONUS), Alaska, Hawaii, and US Territories. Differentiation is made along these lines in accordance with federal law. Army Regulation 500-60 governs Army participation in disaster relief.

Military participation in foreign disaster relief falls into the category of contingency operations. DOD takes part in foreign disaster relief normally at the request for assistance and allocation of funds from the State Department. Prime power units participating in foreign disaster-relief operations are normally OPCON to the senior commander or the senior engineer commander as appropriate.

When supporting disaster-relief operations in CONUS, Alaska, Hawaii, or US Territories, a prime power unit will normally be OPCON to the Defense Coordinating Officer (DCO). For the 48 contiguous states, the DCO is appointed by the continental United States Army (CONUSA) commander. For Alaska, Hawaii, and US Territories, the commander in chief (CINC) of the regional unified command appoints the DCO.

Engineer prime power units also support other types of operations short of war such as contingency operations, peace-keeping operations (PKO), and support for insurgencies and counterinsurgencies. Prime power units supporting these operations will be part of a larger force such as a joint task force (JTF). As such, they will normally be OPCON to the senior US command participating.

PRIME POWER EMPLOYMENT FUNDAMENTALS

Effective employment of prime power units requires a basic understanding of the capabilities discussed in Chapter 3. Knowledge of some basic employment fundamentals is also essential.

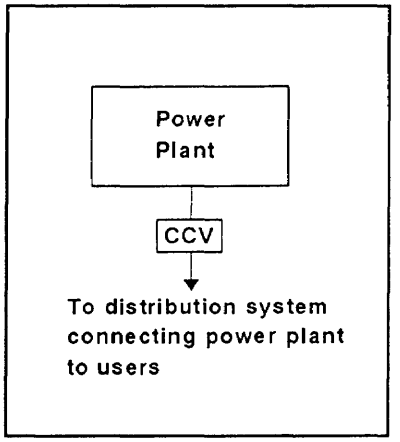

Figure 4-1. Stand-alone mode

Modes of Power Generation

Prime power plants can be used in stand-alone, standby, and load-sharing modes. The stand-alone mode, which is most commonly used, is employed when providing power to locations where commercial power is not available. The standby mode is employed to provide power to a section of the grid when commercial power fails. The load-sharing mode is used to supplement existing power and add capacity to the commercial source. In the standby and load-sharing modes, the plants are connected in parallel with the commercial grid. Figure 4-1 depicts a plant employed in the stand-alone mode. Figure 4-2, page 4-4, shows the standby and load sharing-modes.

Multigenerator plants in any of these three modes can be operated as prime or nonprime plants. Single-generator plants can only be operated as nonprime. By definition, prime power is electrical power that is continuously produced. Single-generator plants cannot be operated nonstop indefinitely; hence, they cannot produce continuous power. Appendix A provides an in-depth discussion of power generation.

Power Transformation and Distribution

The electricity produced by prime power plants must be distributed to the intended users and transformed to the required voltage before it can be used. Transformation can be accomplished by the team's organic equipment or by commercially available nonstandard transformers. When employed with a prime power plant, organic transformation equipment can provide 60-hertz (Hz) power at 480/277 volts or at 208/120 volts. 50-Hz power can be transformed to 380/220 volts.

The prime power team is equipped with enough medium-voltage distribution cable and accessories to allow connection from the power plant to the primary side terminals of its organic mobile substations and distribution transformers. Nonstandard, primary distribution material and all secondary distribution material

must be provided by the supported unit. Secondary distribution material includes the cable, splices, load-distribution centers, circuit breakers, distribution panels, ground rods, and so forth required to make the connections from the secondary side terminals of the transformers to the intended users.

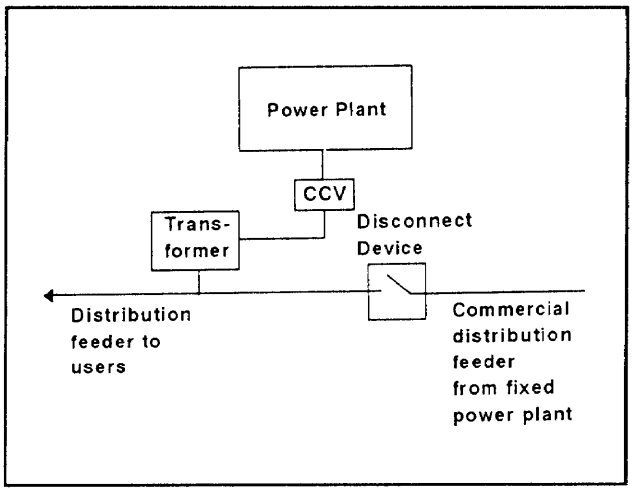

Figure 4-2. Standby and load-sharing modes

The prime power team identifies required materials as part of the design process and lists them on a BOM. These materials may be locally procured or obtained through supply channels (Class IV) by the supported unit. The standard DISE can readily be incorporated into the secondary distribution network. DISE is a Class VII item listed on some unit TOEs. Appendix A contains more information on power transformation and distribution.

Army Facilities Components System (AFCS)

Technical Manuals (TMs) 5-301, 5-302, 5-303, and 5-304 contain TO construction plans that incorporate prime power as an electrical power source. Electrical distribution plans are based on the availability of a 4,160-volt, 3-phase power source. This is the output voltage of prime power plants. The AFCS lists required materials, including distribution transformers, and the anticipated work requirements to install the initial standard (design life of up to six months) distribution system. Initial, standard electrical distribution systems are ground laid. Cable is marked with fences and signs and is buried at road and track crossings. Electrical safety-related construction standards are not relaxed for initial standard construction. Temporary standard (design life of up to 24 months) normally specifies buried or overhead cable installation.

Power System Upgrade

Units and activities that are in place for extended periods may need to upgrade their facilities. For power systems, this upgrade means improving system reliability. Power that is initially provided by TACGENS should be replaced by prime power or commercial power as soon as feasible. This replacement not only saves wear and tear on TACGENS but also improves reliability. Stand-alone

prime power plants should be replaced with commercial power as it becomes available. The desired end result is to use power from the highest level of the power continuum.

Employment Priorities

The priorities for employment of prime power support are the same as those for other engineer support in the theater of operations. FMs 100-16 and 5-116 list engineer support priorities in the TO.

Planning Guidelines

A few basic planning considerations apply to the employment of prime power teams and their assets. Consideration of these guidelines, listed below, will enhance the employment of prime power assets and will result in more reliable electrical service.

1. Consider power requirements as an integral part of the theater base-development planning process and the resultant plan. How much power is needed and where will it come from? Is there a plan to upgrade service after initial installation? Electrical-power planning should never be an afterthought.

2. Use commercial power when it is available. Commercial power is usually reliable in developed countries. Prime power teams can make connections to commercial distribution networks. Once connected, the system can provide continuous power service, virtually maintenance free. A major advantage of using commercial power over installing a plant is that the prime power team remains available to perform other electrical work. When a plant is installed, the team or part of the team is fully committed to operating and maintaining the plant.

3. Conduct preliminary power needs assessment before committing assets. The prime power team can determine what the power needs are and recommend the best way to fulfill them. The team conducts a load survey to determine how much power is required and where it is required, then designs systems to provide power based on the survey. They also recommend the best power source based on the level of reliability required and available assets. Many times, the power requirements are so complex that the supported unit is unable to communicate its power needs. A thorough preliminary assessment solves this problem.

4. Match the power source to load requirements. Resources that are ill suited for a particular application should not be committed. A common violation of this guideline occurs when a large prime power plant is installed to provide power to a relatively light load. This is a waste of scarce resources that could be better used elsewhere. Operating large prime power generators under light loads also

increases the wear and tear on the engine. Prolonged misuse will cause carbon fouling and buildup, reduced engine performance, and eventual engine failure.

5. Anticipate load increases and plan ahead to provide adequate power. If future plans indicate growth that will increase power demands, build the distribution system to handle the growth. This can be done either by overbuilding the system initially or by building it so that it can be readily expanded as needed. Systems that are not anticipating growth should still be designed and built to accommodate 150 percent of the estimated demand.

6. Plan for backup power to critical loads. Some critical facilities such as hospitals and C^3I sites may require backup power. Power outage at these facilities could otherwise mean loss of life or serious mission degradation. Therefore, these critical facilities and activities should have a standby power source even when connected to commercial power.

PRIME POWER SUPPORT REQUEST PROCEDURES

War

Request channels for obtaining prime power support during war are shown in Figure 4-3. In a smaller theater where the theater engineer brigade performs the ENCOM function, it assigns missions to the prime power unit.

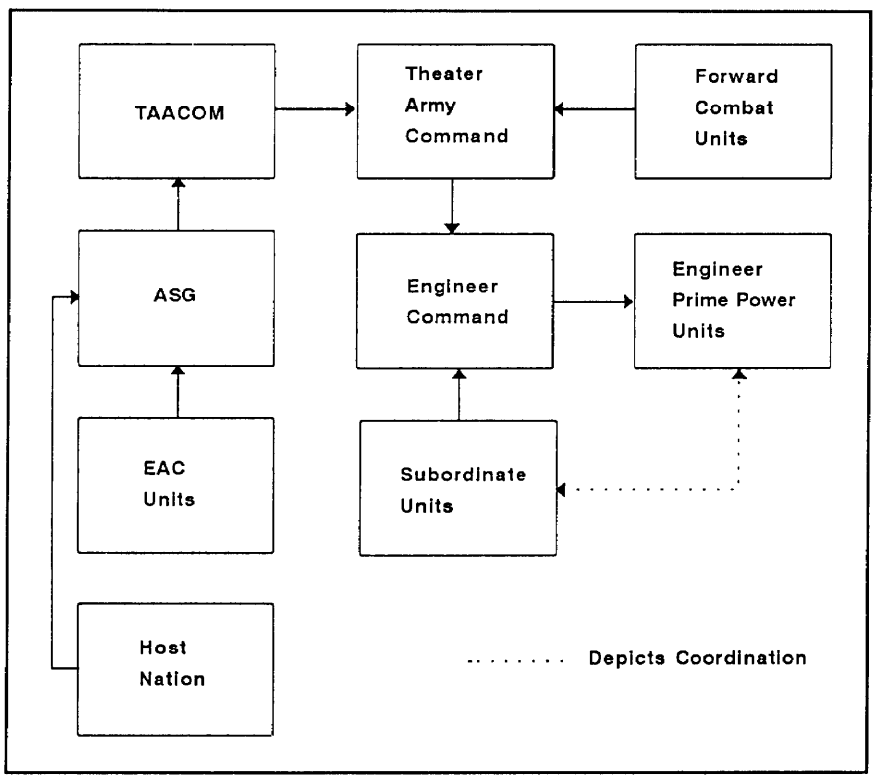

Figure 4-3. Prime power support request channels in war

COMMZ

Echelons above corps (EAC) units, located in the COMMZ, request support through the ASG. The requests are forwarded through the TAACOM to the theater army command. The theater army command approves requests, assigns their priority, and tasks the theater engineer to support them. The theater engineer assigns the missions to the supporting prime power unit. Support requests from the host nation are submitted to the ASG and are handled like all other requests.

Combat Zone (CZ)

Requests for prime power support in the CZ are submitted through command channels to the theater army command. Approved requests are assigned priority and tasked to the theater engineer, who assigns the mission to the supporting prime power unit.

All requests should include as much mission detail as possible and an estimated time for work completion. If available, information as outlined in Appendix B should also accompany requests.

Coordination with other theater engineer units is very important when working together on a construction mission. Close coordination before and during construction will preclude on-the-job confusion between units and will reduce safety hazards associated with electrical construction.

Short of War

Request procedures for prime support to operations short of war can occur under routine or emergency conditions. Figure 4-4, page 4-8, depicts request channels for routine requests. Typically, routine requests are a result of preliminary planning for a particular operation, exercise, or activity. These requests may originate from Army units or joint or sister-service units conducting operations or exercises. They may also originate from government agencies needing support for domestic or foreign activities. Joint and non-Army military requests are forwarded through the appropriate joint specified or unified command to the Joint Chiefs of Staff (JCS) for approval. Nonmilitary requests are forwarded to the Office of the Secretary of Defense (OSD) for approval. Once approved, support taskings are forwarded to the Director of Military Support (DOMS), who determines which service will support the taskings.

Taskings selected to be supported by Army assets are forwarded to the DA Deputy Chief of Staff for Operations (DCSOPS).

Requests from Army units are forwarded through the appropriate MACOM to DA DCSOPS for approval. All taskings are forwarded to USACE and finally to the engineer battalion (prime power). The battalion commander selects the company or team to support the requirement.

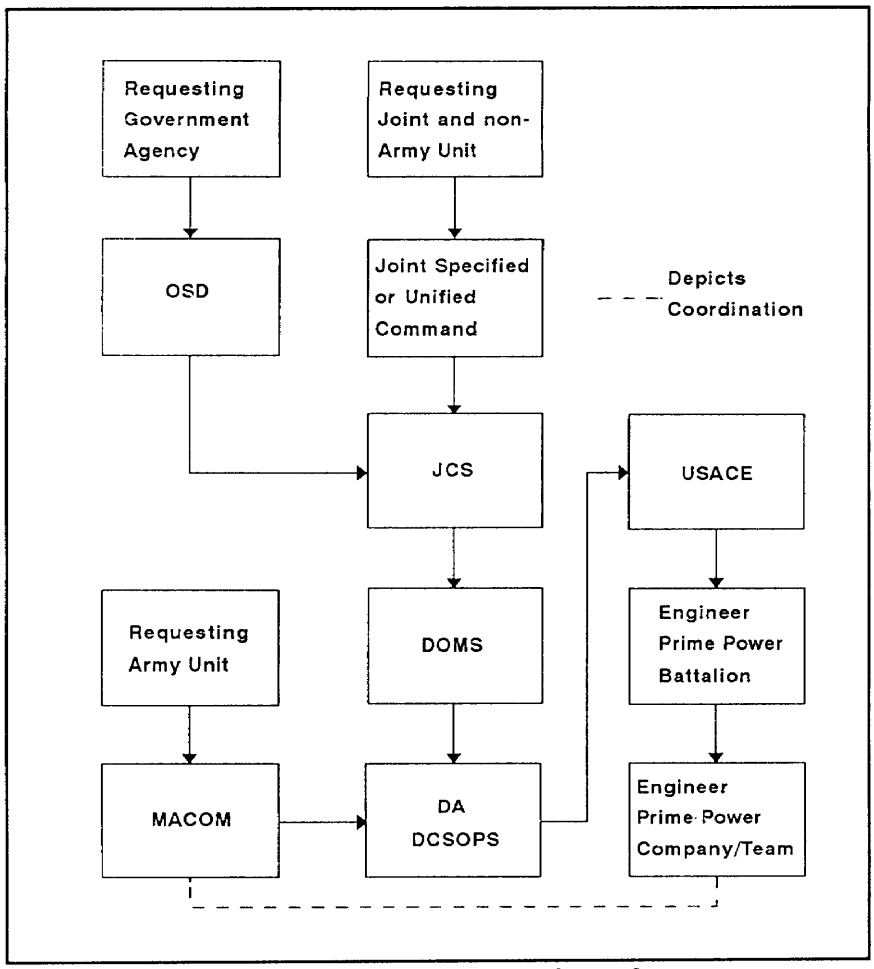

Figure 4-4. Routine prime power request channels

Figure 4-5 illustrates emergency request channels. Emergency request procedures are followed to obtain prime power support for emergencies. Requests for emergency prime power support are usually associated with disaster relief. They may originate from the State Department for overseas disasters or from the Federal Coordinating Officer (FCO) or the DCO for domestic disasters. State Department requests are routed through OSD to the JCS. FCO and DCO requests are routed through the CONUSA or regional CINC to the JCS. The JCS task DOMS, who determines which service will support the tasking. Taskings selected for Army support are forwarded through DA DCSOPS to USACE, who tasks the engineer battalion (prime power).

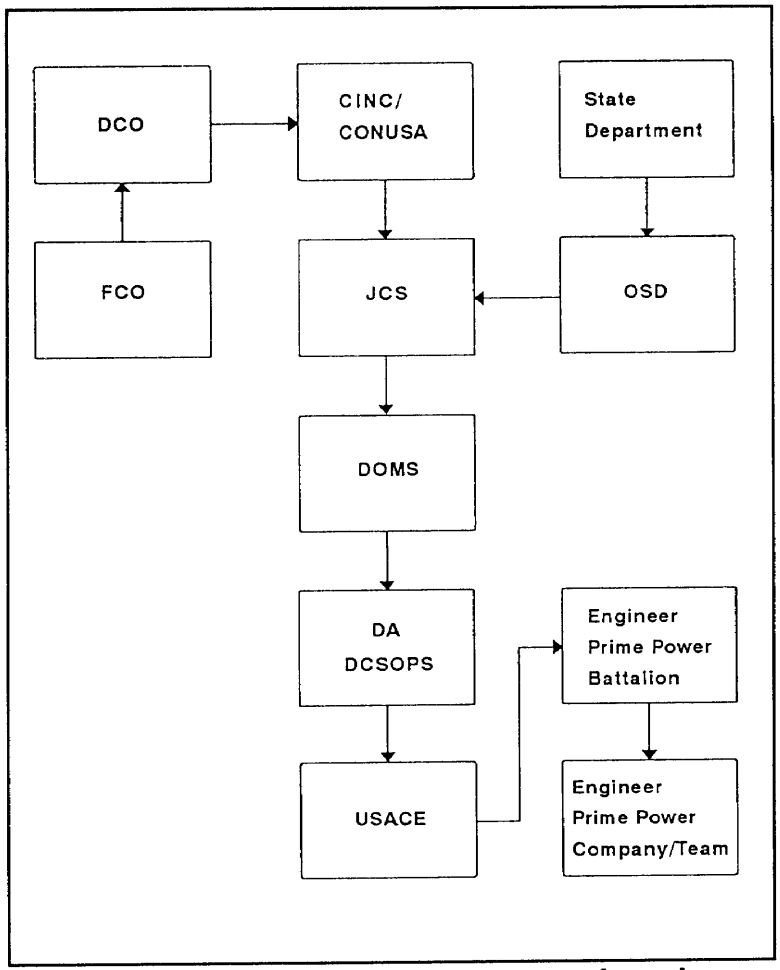

Figure 4-5. Emergency prime power request channels