Report Date: 19 Dec 2013

Summary Report for Individual Task
052-204-2308
Design an Overhead Electrical Distribution System
Status: Approved

Condition: As a Power Line Distribution Specialist supervisor in a tactical or nontactical environment in which an overhead electrical distribution system is to be designed, you are given DA Form 2702 (Bill of Materials) and the existing distribution/new distribution system load requirements one-line diagram. This task should not be trained in MOPP.

Standard: Design an overhead electrical distribution system. Ensure that the designed system is capable of meeting the load parameters without exceeding equipment operating limits.

Special Condition: None

Safety Level: Low

MOPP: Never

Task Statements

Cue: None

DANGER

None

WARNING

None

CAUTION

None

Remarks: All required Prime Power specific references and technical manuals will be provided by the local Prime Power Command.

Notes: None

Performance Steps

1. Determine the maximum load requirement.

2. Identify the origin of the incoming power source as an isolated power plant, overhead distribution from a power grid, or underground distribution from a power grid.

3. Identify the location and size of each load.

4. Determine the size of the transformers based on the load requirement.

    a. Calculate ten percent above the maximum load if the load will not increase.

    b. Oversize the transformers according to the planned expansion if the load is to increase over time.

5. Determine route selection

    a. Identify points of direction

    Note: Points of direction are transformer locations, tap line locations and locations necessary to achieve horizontal or verticle clearances.

    b. Identify property lines

6. Determine loading zone

    a. Determine grade of construction

    b. Determine overload factor

    c. Determine strength factor

7. Determine the proper placement of the transformers.

    a. Base the placement on distances between the transformers.

    b. Base the placement on distances from living and working areas.

8. Determine conductor loading factors

    a. Determine vertical load factors

    b. Determine horizontal load factors

    c. Determine resultant load factors

9. Determine the size of the conductors.

    a. Base the size on amperage required for set loads.

    b. Base the size on transformer output if the load is expected to increase.

    c. Base the size on the type of conductor to be used.

d. Base the size on voltage drop calculations.

Note: Always use the lowest values given for that conductor when determining cable sizing if the cable type and manufacturer are unknown.

10. Determine conductor tension

Note: Conductor line tensions are based upon five Items: Loading district, conductor type, ruling span, conductor sag, temperature of conductor due to electrical loading and/or ambient temperature.

11. Select proper pole top assemblies

Note: Common types of construction are standard crossarm, narrow profile and overhead cable.

12. Create distribution system drawings.

a. Draw One-Line Diagram

b. Draw Staking Sheets.

c. Draw Specification Sheets.

d. Draw wiring diagrams.

13. Prepare a materials takeoff list, taking into account the total quantity of items to be installed, include the following items as a minimum.

Note: System needs will determine all required stock for the system being designed, these steps are just the basics.

a. Switchgear.

b. Protective devices.

c. Cable lengths.

d. Utility poles and crossarms.

e. Guy wires and anchors.

f. Insulators.

g. Transformers.

h. Mounting hardware.

i. Lightning arrestors.

j. Grounding materials.

14. Request a review by supervisor.

15. Submit the design to the chain of command to be forward to the customer.

(Asterisks indicates a leader performance step.)

Evaluation Guidance: Score the Soldier GO if all performance measures are passed (P).
Score the Soldier NO GO if any performance measure is failed (F).
If the Soldier scores NO GO, show the Soldier what was done wrong and how to do it correctly.

Evaluation Preparation: Provide the Soldier with the items in the conditions. Give the Soldier a safety briefing before starting, and ensure that all safety precautions are followed. Prepare area and equipment in advance to ensure that the task standards can be met.

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Determined the maximum load requirement.			
2. Identified the origin of the incoming power source as an isolated power plant, overhead distribution from a power grid, or underground distribution from a power grid.			
3. Identified the location and size of each load.			
4. Determined the size of the transformers based on the load requirement.			
5. Determined route selection.			
6. Determined loading zone.			
7. Determined the proper placement of the transformers.			
8. Determined conductor loading factors.			
9. Determined the size of the conductors.			
10. Determined conductor tension.			
11. Selected proper pole top assemblies.			
12. Created distribution system drawings.			
13. Prepared a materials takeoff list, taking into account the total quantitly of items to be installed.			
14. Requested a review by supervisor.			
15. Submitted the design to the chain of command to be forwarded to the customer.			

Supporting Reference(s):

Step Number	Reference ID	Reference Name	Required	Primary
	DA FORM 2702	Bill of Materials	Yes	No
	LCH	The Lineman's and Cableman's Handbook, 11th Edition, McGraw-Hill. 2007	No	No
	NFPA 70®	National Electrical Code® (NEC®) Handbook. 2011 edition	No	No
	TM 5-704	Construction Print Reading in the Field. AFM 85-27.	No	No
	TM 5-811-1	Electric Power Supply and Distribution {AFJMAN 32-1080}	No	No
	TM 5-811-3	Electrical Design: Lightning and Static Electricity Protection. AFM 88-9, Chap 3.	No	No
	UGLYS™	Ugly's Electrical References. 2005	No	No

Environment: Environmental protection is not just the law but the right thing to do. It is a continual process and starts with deliberate planning. Always be alert to ways to protect our environment during training and missions. In doing so, you will contribute to the sustainment of our training resources while protecting people and the environment from harmful effects. Refer to FM 3-34.5 Environmental Considerations and GTA 05-08-002 ENVIRONMENTAL-RELATED RISK ASSESSMENT. For classroom instruction:
No major environmental impact, training entirely of an administrative or classroom nature, with little or no environmental impact on the environment, equipment or personnel. [32 CFR Part 651, Appendix B, Section II, (i)(2)]

For practical exercises and demonstrations:
Instructors should complete a risk assessment before conducting training, operations, or logistical activities. Risk assessments assist instructors in identifying potential environmental hazards, develops controls, make risk decisions, implement controls, and ensure proper supervision and evaluation. FM 3-100.4, Environmental Considerations in Military

Operations.

Safety: In a training environment, leaders must perform a risk assessment in accordance with FM 5-19, Risk Management. Leaders will complete a DA Form 7566 COMPOSITE RISK MANAGEMENT WORKSHEET during the planning and completion of each task and sub-task by assessing mission, enemy, terrain and weather, troops and support available-time available and civil considerations, (METT-TC). Note: During MOPP training, leaders must ensure personnel are monitored for potential heat injury. Local policies and procedures must be followed during times of increased heat category in order to avoid heat related injury. Consider the MOPP work/rest cycles and water replacement guidelines IAW FM 3-11.4, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection, FM 3-11.5, Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination. All safety considerations are mentioned in the task performance steps and are annotated as DANGERS, CAUTIONS and WARNINGS. A thorough risk assessment must be completed prior to every mission or operation.

Prerequisite Individual Tasks : None

Supporting Individual Tasks :

Task Number	Title	Proponent	Status
052-204-2211	Develop a Bill of Materials (BOM) List	052 - Engineer (Individual)	Approved
052-204-2217	Manage a Power Line Crew	052 - Engineer (Individual)	Approved
052-204-1121	Install High-Intensity Lights and Ballasts	052 - Engineer (Individual)	Approved

Supported Individual Tasks :

Task Number	Title	Proponent	Status
052-204-2306	Supervise the Installation of a Utility Pole	052 - Engineer (Individual)	Approved
052-204-2307	Supervise the Installation of a Utility Pole Line	052 - Engineer (Individual)	Reviewed
052-204-3015	Supervise the Sagging of Overhead Conductors	052 - Engineer (Individual)	Approved
052-204-3016	Supervise the Stringing of Overhead Conductors	052 - Engineer (Individual)	Approved

Supported Collective Tasks :

Task Number	Title	Proponent	Status
05-3-5700	Install Nonstandard Low-Voltage, Electrical-Power Distribution Equipment	05 - Engineers (Collective)	Approved
05-3-5701	Install Low-Voltage, Electrical-Power Distribution Equipment	05 - Engineers (Collective)	Approved
05-3-5725	Install Aerial Electrical Power Distribution Equipment	05 - Engineers (Collective)	Approved
05-3-5717	Perform Power Plant Distribution System Design Technical Assistance	05 - Engineers (Collective)	Approved
05-3-5720	Select a Temporary Power Plant Site	05 - Engineers (Collective)	Approved
05-3-5722	Prepare Power Systems Construction Estimates	05 - Engineers (Collective)	Approved
05-3-5708	Perform a Mission Survey	05 - Engineers (Collective)	Approved
05-3-5728	Assess Power Generation Systems for Damage	05 - Engineers (Collective)	Approved

ICTL Data :

ICTL Title	Personnel Type	MOS Data
12Q30, Power Line Distribution Specialist, skill level 3	Enlisted	MOS: 12Q, Skill Level: SL3