UNITED STATES MARINE CORPS
Utilities Instruction Company
Marine Corps Engineer School
PSC Box 20069
Camp Lejeune, North Carolina 28542-0069

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May 00

STUDENT HANDOUT

MEPS OPERATION

1. **LEARNING OBJECTIVES**:

a. **Terminal Learning Objective**:

(1) Provided a generator set, mechanic's tool box, and the reference, operate the generator set, so that it will apply voltage to appropriate equipment per the reference. (1141.02.02)

(2) Provided a schematic, a faulty generator set electrical system, and applicable tools and test equipment, with the aid of references, repair the generator set electrical system so that it functions properly in accordance with the appropriate equipment technical manual. (1142.01.03)

b. **Enabling Learning Objectives**:

(1) Provided a selection of depths that a grounding rod shall be driven into the earth, without the aid of reference, select the minimum depth that a grounding rod shall be driven to provide a proper ground, in accordance with FM 5-424. (1141.02.02e) (1142.01.03ah)

(2) Provided a selection of conductor sizes, without the aid of reference, identify the correct size conductor that may be used to properly ground a generator, in accordance with FM 5-424. (1141.02.02f) (1142.01.03ai)

(3) Provided a selection of devices and materials, without the aid of reference, identify the required environmental protection devices and materials to be used when establishing a generator site, in accordance with MCO 11000.8b Real Property Facilities Manual. (1141.02.02g) (1142.01.03aj)

(4) Provided a selection of correct and incorrect steps for positioning a generator for operation, without the aid of reference, identify the correct steps that are required to setup a generator, in accordance with the applicable Technical Manual. (1141.02.02h) (1142.01.03ak)

(5) Provided with a generator, without the aid of reference, perform a before operations check, in accordance with the applicable Technical Manual. (1141.02.02i) (1142.01.03al)

(6) Provided with a generator and hearing protection, without the aid of reference, start the generator, in accordance with the applicable Technical Manual. (1141.02.02j) (1142.01.03am)

(7) Provided an operating generator and hearing protection, without the aid of reference, perform a during operations check, in accordance with the applicable Technical Manual. (1141.02.02k) (1142.01.03an)

(8) Provided an operating generator, load conditions, frequency requirements, and hearing protection, adjust the frequency, in accordance with the applicable Technical Manual. (1141.02.02l) (1142.01.03ao)

(9) Provided an operating generator, load conditions, frequency requirements, and hearing protection, adjust the voltage, in accordance with the applicable Technical Manual. (1141.02.02m) (1142.01.03ap)

(10) Provided an operating generator that is connected to a load. With hearing protection on, energize the load in accordance with the applicable Technical Manual. (1141.02.02n) (1142.01.03aq)

(11) Provided a generator that is energizing a load and hearing protection, de-energize the load, in accordance with the applicable Technical Manual. (1141.02.02o) (1142.01.03ar)

(12) Provided an operating generator and hearing protection, without the aid of reference, shutdown the generator, in accordance with the applicable Technical Manual. (1141.02.02p) (1142.01.03as)

(13) Provided with a generator, without the aid of reference, perform an after operations check, in accordance with the applicable Technical Manual. (1141.02.02q) (1142.01.03at)

1. **Grounding the Generator**:

a. Electrical power-generating equipment must be grounded. If the generator is not grounded, stray electrical current within the generator or the distribution system can injure or kill the operator and damage the equipment. The generator may be grounded with a grounding rod, pipe, or plate.

1. The standard grounding rod used by military units is a 5/8 inch copper rod with three 3-foot sections. To install a grounding rod, drive it at least 8 feet into the soil. The rod must be buried below the moisture level. If one grounding rod does not produce a good grounding system, you can form a network with three or more rods. Install the rods about 6 feet apart. If three rods form the network, place them in a straight line or a triangular pattern. If more than three rods are used, install them in a straight line and connect the grounding cable from the generator to each grounding rod.

2. The grounding pipe is a clean, metallic pipe of ¾ inch trade size or larger to make a grounding pipe. Pipes made of iron or steel must be galvanized or coated for corrosion protection. Drive the rod 8 feet into the soil, if you can.

3. You may use a buried grounding plate as a ground. The plate must be at least 36 inches wide and 36 inches long. An iron or steel place maybe substituted for a place electrode if it is at least a quarter of an inch thick and coated for corrosive protection. Grounding plates must be buried below the moisture level.

4. Attach the grounding system with a # 6 AWG or larger cable. Connect one end of the cable to the grounding terminal of the generator set. Tighten the nut securely, as described in the appropriate TM. Connect the other end of the cable to the grounding electrode with a special grounding clamp.

2. **Environmental Protection Devices**:

a. Environmental protection devices are to keep fuel, oil, water, and coolant that maybe leaking from the generator and auxiliary fuel barrel off the ground. There are four types of environmental protection devices. They are fuel burms, drip pans, over packs, and quick burms.

1. The fuel burms size depends on the size of the generator. To construct a fuel burm use sand bags and tarps. Place two layers of sandbags in a rectangle larger than the size of the generator. Put the tarp over the sandbags, then the generator is put into place. The tarp is laid flat on the sand bags and another row of bags are placed on the tarp.

2. A drip pan is a metal pan that will slide under the generator on a trailer to catch anything leaking. A generator can also be placed inside of a drip pan. The disadvantage to this is the size of the drip pan limits the size of the generator and takes up extreme amount of space.

3. An over pack is used for the auxiliary fuel barrel. If the barrel is overfilled or develops a leak the fuel will run off to the sides of the over pack to keep the ground from being contaminated.

4. The quick burms are a new device for the Marine Corps. They are similar to the drip pan except it is made of a tarp material. The quick burm folds up to conserve space and assembles with a few metal rods.

3. **Setting Up The Generator**:

a. The location of the generator set affects the efficiency of the power system. Provide shelter for the generator set. Although the equipment is weather-resistant, it needs protection from inclement weather and enemy fire.

b. Uses the following guides to select a site for the generators:

1. Provide enough clearance around the generator set to perform maintenance procedures.

2. Place the generator set away from areas where noise may be a problem.

3. Mount the generator set in an area that is clean, level, dry, well-ventilated, and well-drained.

4. Enclose auxiliary fuel supply tanks that are above ground with engineer tape to rope off the area.

4. **Before Operations Preventive Maintenance**:

(COMMONLY REFERRED TO AS A BEFORE OPERATIONS 360 DEGREES INSPECTION)

a. Check for proper grounding connections. Check grounding connection at the generator and at the grounding rod.

WARNING: NEVER ATTEMPT TO START THE GENERATOR SET IF IT IS NOT PROPERLY GROUNDED. FAILURE TO OBSERVE THIS WARNING MAY RESULT IN SERIOUS INJURY OR DEATH BY ELECTROCUTION.

b. Inspect load studs for proper connection and tightness.

c. Check voltage reconnection board for the proper setting of 120/208 or 240/416.

d. Visually inspect the generator set for fuel, oil, hydraulic, water, and coolant leaks.

e. Check coolant level. Proper level is two inches below the overflow pipe. Add coolant as required.

f. Check engine oil level. Add oil as necessary.

g. Check batteries for tightness and the electrolyte level. If the electrolyte is low use the cleanest water available to fill.

h. Control panel. Check all meters, gauges, lights and switches for proper operation or damage. (ENERGIZE DC BREAKER TO CHECK CONTROL PANEL.)

i. Day tank: Drain water and sediment.

j. Main fuel tank. Fill main tank.

k. Fuel filters and strainer. Drain water and sediment.

l. Check fuel selector valve for proper positions

m. Visually inspect the entire unit for missing, loose or damaged parts, hardware and for unusual wear or deterioration to include radiator louvers shut and hatches closing except for the front air intake doors and control cubicle.

n. Check the paralleling receptacles, the slave receptacle, and the convenience receptacle to make sure that there is nothing broken or stuff into them.

o. Speed switch. Push to reset.

p. Close all doors except for the front air intake doors and control cubicle.

5. **Start The Generator Set**:

a. Press in the DC circuit breaker.

b. Place the start-run-stop switch in the run position and the battle short switch in the on position. Leave the start-run-stop switch in the run position and the battle short switch in the on position until the clicking noise of the electric fuel pumps slows down and becomes steady.

c. Place the battle short switch in the off position.

d. Depress the fault indicator test or reset switch to check that all the fault indicator lights illuminate.

e. Pull the manual speed control all the ways out and then push it in approximately half way.

f. Hold the start-run-stop switch in the start position until the engine is running, the oil pressure gauge indicates oil pressure and the voltmeter indicates voltage.

CAUTION: DO NOT CRANK THE ENGINE IN EXCESS OF 15 SECONDS. ALLOW THE STARTER ASSEMBLY TO COOL AT LEAST 15 SECONDS BETWEEN CRANKING.

g. Release the start-run-stop switch to the run position.

h. Adjust the frequency to the desired value as indicated on the frequency meter with the throttle.

i. Rotate the voltage adjust rheostat until the desired voltage is indicated on the AC voltmeter.

j. Let the generator warm-up for 3-5 minutes.

k. Hold the circuit breaker switch in the close position until the circuit breaker indicator illuminates.

l. Observe all engine and generator instruments for normal readings.

6. **During Operations Preventive Maintenance**:

a. Check the Control Panel to include meters, gauges, lights and switches for proper operation and level indications in accordance with the technical manual.

b. Visually inspect the generator set for fuel, oil, hydraulic and coolant leaks.

CAUTION: WHEN WORKING ON OR AROUND UNIT WHILE IT IS OPERATING UTILIZE CAUTION AROUND BELTS AND ALL MOVING PARTS.

c. Checks engines oil levels and adjust as required. (ONLY ON MEP-005A AND LARGER WHILE UNIT IS OPERATING)

d. Main fuel tank. Check gauges and fill as required.

e. **Visually inspect** the entire unit for missing, loose, damaged, unusual wear, deterioration or burning, parts or hardware.

f. Close all doors except for the front air intake doors and control cubicle.

7. **Shutdown The Generator Set**:

a. Place the load contact circuit breaker switch in the open position.

b. Allow the generator set to operate approximately three to five minutes with no load applied. ***DO NOT READJUST FREQUENCY PRIOR TO SHUTDOWN***

c. Place the start-run-stop switch in the stop position.

d. Adjust the voltage adjust rheostat all the way to the left.

e. Push the manual speed control throttle all the way in.

f. Pull the DC circuit breaker out.

8. **After Operations Preventive Maintenance**:

a. Check for proper grounding connections. If moving generators disconnect the ground and remove the grounding rods from the ground.

b. Visually inspect the generator set for fuel, oil, hydraulic, water, and coolant leaks.

c. Check engine oil level and refill.

d. Check battery for tightness and the electrolyte level. If the electrolyte is low use the purest water available to fill.

e. Control panel. Check all meters, gauges, lights and switches for proper operation or damage. (ENERGIZE DC BREAKER TO CHECK CONTROL PANEL.)

f. Day tank: Drain water and sediment.

g. Main fuel tank. Fill main tank.

h. Fuel filters and strainer. Drain water and sediment.

i. Visually inspect the entire unit for missing, loose or damaged parts, hardware and for unusual wear or deterioration to include radiator louvers shut and hatches closing except for the front air intake doors and control cubicle.

j. Check the paralleling receptacles, the slave receptacle, and the convenience receptacle to make sure that there is nothing broken or stuff into them.

k. Speed switch. Push to reset.

l. Close all doors.

n. Check coolant level. When the generator has cooled down, but not until for it will burn you. Add coolant as required.

REFERENCES: TM 05926B/06509B
TM 00038G/07499A
TM 05684C/06585B
TM 06858B/06859D-1
FM 5-424