

UNITED STATES MARINE CORPS
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STUDENT HANDOUT

PERFORM GENERATOR SET LOAD TEST

Terminal Learning Objective: Provided a military standard generator set, a mechanic's tool box, a multimeter, and a dummy load, perform a generator load test in accordance with the technical manual. (1141.02.03)

Enabling Learning Objectives:

(1) Provided with a list of dummy load instruments and a selection of instrument functions, without the aid of reference, identify the correct function for each instrument, in accordance with MCI 11.41a, and TM 07500B-14. (1141.02.03a)

(2) Provided with a list of dummy load components and a selection of component functions, without the aid of reference, identify the correct function for each component, in accordance with MCI 11.41a, and TM 07500B-14. (1141.02.03b)

(3) Provided an illustration of a dummy load terminal board and generator set load terminal board, without the aid of reference, select the correct illustration that connects the dummy load to the generator set, in accordance with MCI 11.41a, TM 07500B-14. (1141.02.03d)

(4) Provided a dummy load connected to a generator set, without the aid of reference, perform a before operations check on the dummy load, in accordance with MCI 11.41a, TM 07500B-14. (1141.02.03e)

(5) Provided a dummy load and a generator set that are connected, without the aid of reference, select the proper amount of load to be placed on the dummy load, in accordance with MCI 11.41a, TM 07500B-14. (1141.02.03e)

(6) Provided a dummy load that is connected to an operating generator and hearing protection, without the aid of reference, start the dummy load, in accordance with MCI 11.41a, TM 07500B-14. (1141.02.03f)

(7) Provided a dummy load that is in operation and hearing protection, without the aid of reference, apply a load to the generator set, in accordance with MCI 11.41a, TM 07500B-14. (1141.02.03g)

(8) Provided a dummy load that is in operation and hearing protection, without the aid of reference, perform a during operations check, in accordance with MCI 11.41a, TM 07500B-14. (1141.02.03h)

(9) Provided a dummy load that is in operation and hearing protection, without the aid of reference, shut down the dummy load, in accordance with MCI 11.41a, TM 07500B-14. (1141.02.03i)

(10) Provided a dummy load that is shut down, without the aid of reference, perform an after operation check, in accordance with MCI 11.41a, and TM 07500B-14. (1141.02.03j)

BODY

1. Dummy Load Instrument Function:

a. **AC Voltmeter**. measures the input voltage and is a dual-scaled meter, 0-150 volts and 0-300 volts.

b. **AC Ammeter**. Measures the current and has scale ranges of 0-50 amps, 0-100 amps, 0-250 amps or 0-500 amps.

c. **Kilo-Volt-Amp (KVA) Meter**. Measures the KVA and has scale ranges of 0-5 KVA, 0-10 KVA, 0-25 KVA, or 0-50 KVA.

d. **Frequency Meter**. Measures the input frequency and is dual scaled so that it can read both 60 hertz and 400 hertz. The 60 hertz scale is ranged from 56-64 hertz, and the 400 hertz scale is ranged from 375-425 hertz. When checking the frequency, always go by the meter on the dummy load control panel, not the meter on the generator control panel.

e. **Phase Sequence Indicator Lights**. Indicate whether the phase connection between the generator and the dummy load are

correct. When properly connected the light marked "ABC" will light up; however, if the connection is incorrect the light marked "CBA" will come on. You must then shut down both the generator and the dummy load in order to reconnect the load cable properly.

f. **Voltage Selector Switch**. Has three positions, "120/208 volt", "240/416 volt", or "OFF" and programs the dummy load to correspond to the input voltage as selected by the generator's reconnection board.

g. **Panel Light Dimmer Switch**. Is used primarily when in the field and operating at night under alert type conditions. It is a variable resistor that controls the brightness of the panel lights.

h. **Panel Lights**. Enable the operator to read the meters and operate the dummy load during the hours of darkness.

i. **0-1 KVA Variable Load Switch**. Allows you to place a reactive load on the generator anywhere in the range of 0 to 1 KVA. There is one control for each phase.

j. **1 KVA Load Switch**. Connects a fixed reactive load of 1 KVA. There is one toggle switch for each phase.

k. **2 KVA Load Switch**. Allows you to connect a fixed reactive load of 2 KVA. There are two toggle switches for each phase.

l. **4 KVA Load Switch**. Allows you to connect a fixed reactive load of 4 KVA. There is one toggle switch for each phase.

m. **6 KVA Load Switch**. Allows the operator to connect a reactive load of 6 KVA. There are four toggle switches for each phase.

n. **External Power Selector Switch**. Selects power for the cooling fan and load bank contactor from within the dummy load or from an external power supply through the utility connector.

2. **Dummy Load Component Functions:**

a. **Phase Sequence Relay:** The PSR provides a front panel indication of the phase status of the input lines. The PSR monitors the input lines L1, L2, and L3. If the input lines are connected correctly the "ABC" light will come on, if they are connected incorrectly the "CBA" light will illuminate.

b. **Meter Overload Module**: The MOM provides protection of the ammeters due to a current overload. The MOM monitors the input line current at the current transformers.

c. **Supervisory Control Module**: The SCM provides protection for over voltage, over current, incorrect voltage switch settings and single phasing by removing power from the contactors.

d. **Air Flow Switch**: The Air Flow Switch monitors the cooling fan air flow. A loss of air flow opens the switch which in turn de-energizes the contactors. Reduced air flow can be caused by closing one or both side doors, obstructing the air inlet or exhaust ports.

e. **Radio Frequency Interference Filter**: An RFI filter is connected to the exhaust fan power leads to prevent the motor noise from being radiated by the fan.

3. **Connection Of Dummy Load To Generator**: When connecting the cables to the Dummy Load it is important to remember that which ever wire goes to L1 on the generator goes to L1 on the Dummy Load, L2 to L2, L3 to L3, and L0 to L0. Also, as with any piece of equipment, always be sure **BOTH** units are grounded.

4. **Before Operation Checks**:

a. Set up the dummy load in an area with plenty of air flow around the unit since it depends on fresh air flow for cooling. Make sure there is at least three feet of clear area around the rear and sides of the dummy load. In the front of the unit, where the resistive load heating elements are, allow at least fifteen feet of air space. Remove any type of obstruction which could stop the air flow or re-circulate the hot exhaust. Never place the load bank on a slope greater than 15 degrees.

b. Once the unit has been properly located, connect it to the generator and perform the pre-operation checks.

(1) Open the control panel doors and latch them so they do not accidentally close and injure someone or damage the unit. After opening the door, thoroughly check the control panel for any damage which might have occurred during shipping. Check the switches and ensure that they are all in the off position.

(2) Open the two air intake doors, one on either side of

the unit. Fold the lower half of the intake doors up into access door and fold the access door down so that the air intake door is latched into place. Then move to the front of the unit and open the air exhaust door. Once again, make sure that it is attached in place to prevent it from accidentally closing. Be sure there is nothing blocking the front and side panels which would prevent the dummy load from being properly cooled.

(3) Take a load cable or wire and connect the dummy load to the generator which you want to test. Be sure the cable is rated at the maximum amperage which you will be testing the generator for. If not, serious damage could be done to either the dummy load, the generator or yourself. When connecting the cable make sure the phase relationship is right; connect L_1 on the generator to L_1 on the dummy load, L_2 to L_2 and so forth.

(4) Drive a ground rod into the ground and connect the dummy load to the rod with a piece of #6 AWG wire. This is to protect you in case of a short circuit or an accidental ground. Ground the generator. It may be grounded to the same ground rod but this is not a necessity.

5. **Determining The Proper Amount Of Load:** Each generator is rated at a certain amount of power output. The recommended amount of load to be applied to the generator is 80% of the rated power. For example, a MEP-805A generator is rated at 30 KW, the proper amount of load would be approximately 24 KW.

6. **Start Up Procedures:**

- a. Preset the switches on the load bank.
- b. Set the input voltage selector switch to match the connection of the reconnection board on the generator. This will program the relays within the dummy load for either 120/208 volt operation or 240/416 volt operation.
- c. Push the ON button. At this time the cooling fan should begin to operate and the phase indication lights should come on.
- d. Check the Voltmeters and Frequency meter to verify the proper readings.

7. **Applying The Load:** At this point you are ready to start applying the load. Keeping in mind that you want to put about 80% load on the generator, begin turning the switches to the on

position one at a time. Be sure to also keep the load balanced throughout the process.

8. **During Operation Checks:**

a. During operation continuously monitor the voltage and ammeters, and adjust the settings on the generator as necessary.

b. Always be on the alert for fires due to heat made by the load bank, and insure that the doors are securely latched open.

9. **Shutdown The Dummy Load:**

a. First, we need to begin de-energizing the load switches, once again one at a time and keeping the load balanced.

b. Once all the load switches are turned off, keep the load bank running until you feel cool air coming from the exhaust port of the fan. If we do not let the heating elements completely cool down the elements will begin to sag over time and this will cause problems in operation.

c. Once you feel cool air coming out of the exhaust port then simply push the off button and then go through the shutdown procedures for the generator set.

10. **After Operation Checks:**

a. After the unit has been shutdown. Check all gauges, wires, and connections for damage.

b. Close all doors and disconnect the power cable and ground cable.

REFERENCES: TM 00038G/07499A
TM 05684C/06585B
TM 05926B/06509B
TM 06585B/06859D-1
TM 07500B-14
MCI 11.41A