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STUDENT HANDOUT

TACTICAL QUIET GENERATOR SET OPERATIONS

1. **LEARNING OBJECTIVES:**

a. **Terminal Learning Objective:** 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.

b. **Enabling Learning Objective:**

(1) Given a list of Tactical Quiet Generator Sets and a list of Tactical Quiet Generator Set characteristics, match each generator set to its characteristics in accordance with TM-09249A/09246A-10/1. (1142.01.03bq)

(2) Given a list of Tactical Quiet Generator Set controls, identify the function of each control in accordance with TM-09249A/09246A-10/1. (1142.01.03br)

(3) Given a list of Tactical Quiet Generator Set components, identify the function of each component in accordance with TM-09249A/09246A-10/1. (1142.01.03bs)

(4) Provided a Tactical Quiet Generator Set with components numbered and a list of components, match each component to its number in accordance with TM-09249A/09246A-10/1. (1142.01.03bt)

(5) Provided a Tactical Quiet Generator Set, perform before operation maintenance in accordance with TM-09249A/09246A-10/1. (1142.01.03bu)

(6) Provided a Tactical Quiet Generator Set, start the generator, in accordance with TM-09249A/09246A-10/1. (1142.01.03bv)

(7) Provided a Tactical Quiet Generator Set, perform during operation maintenance in accordance with TM-09249A/09246A-10/1. (1142.01.03bw)

(8) Provided an operating Tactical Quiet Generator Set, shut down the generator in accordance with TM-09249A/09246A-10/1. (1142.01.03bx)

(9) Provided a Tactical Quiet Generator Set, perform after operation maintenance in accordance with TM-09249A/09246A-10/1. (1142.01.03by)

BODY:

1. Characteristics of Tactical Quiet Generators:

a. MEP-803:

(1) The MEP 803 is a 10,000 watt (10KW) generator producing 60Hz electric power. This generator is driven by a four cylinder water-cooled Diesel Engine.

(2) The output voltages for this unit are 120 VAC single phase, 120/240 VAC single phase, and 120/208 VAC three phase.

b. MEP-813:

(1) The MEP 813 is an exact replica of the MEP-803 except that it is a unit that produces 400 Hz electric power.

c. MEP-805:

(1) The MEP 805 is a 30,000-watt (30KW) generator producing 50/60Hz precise electric power. This generator is driven by a four-cylinder turbo charged engine with a fuel metering injector pump controlled by an electronic actuator.

(2) The output voltages for this unit are 120/208 VAC on low wye and 240/416 VAC on high wye.

(3) This unit has a malfunction indicator panel, which indicates when an operational fault has occurred.

(ON CAG-12 & 13)

d. MEP-815:

(1) The MEP 815 is an exact replica of the MEP-805 except that it is a unit that produces 400Hz electric power.

(ON CAG-14 & 15)

e. MEP-806:

(1) The MEP 806 is a 60,000-watt (60KW) generator producing 50/60 Hz precise electric power. This generator is driven by a six-cylinder turbo charged engine with a fuel metering injector pump controlled by an electronic actuator.

(2) The output voltages for this unit are 120/208 VAC on low wye and 240/416 VAC on high wye.

f. MEP-816:

(1) The MEP 816 is an exact replica of the MEP-806 except that it is a unit that produces 400 Hz electric power.

2. Control Panel Instruments of the Tactical Quiet Generator: 3.

a. Control Panel Instruments and Controls: The control panel contains the various controls and instruments that provide the operator with sufficient information to ensure proper operation of the generator set. The control panel is the same for all Tactical Quiet Generator Sets.

(ON CAG-20 & 21)

(1) Fuel Level Indicator: Indicates the level of fuel in the main fuel tank.

(ON CAG-22 & 23)

(2) Panel Lights: The panel lights illuminate the control panel.

(ON CAG-24 & 25)

(3) Coolant Temperature Indicator: Indicates engine coolant temperature (normal operation range is 1701- 2001F)

(ON CAG-26 & 27)

(4) Ether Switch: The ether switch activates or deactivates the cold weather starting aid system.

(ON CAG-28 & 29)

(5) Panel Light Switch: Activates or deactivates the panel lights.

(ON CAG-30 & 31)

(6) Frequency Meter (Hertz): Indicates generator set output frequency.

(ON CAG-32 & 33)

(7) Ammeter (Percent Rated Current): Indicates generator set load current, as a percentage of rated current.

(ON CAG-34 & 35)

(8) AM-VM Transfer Switch: Allows selection of current and voltage readings between output load terminals as follows

<u>Switch Position</u>	<u>Voltage</u>		<u>Current</u>
	<u>Low Wye</u>	<u>High Wye</u>	
L1 - L0	120v	240v	L1
L2 - L0	120v	240v	L2
L3 - L0	120v	240v	L3
L1 - L2	208v	416v	None
L2 - L3	208v	416v	None
L1 - L3	208v	416v	None

(ON CAG-36 & 37)

(9) Kilowatt meter (Percent Power): Indicates generator set output power as a percent of rated power.

(ON CAG-38 & 39)

(10) AC Voltmeter (Volts AC): Indicates output voltage of the generator set.

(ON CAG-40 & 41)

(11) Battle Short Switch : Bypasses all protective devices except for short circuit.

(12) Battle Short Light: Amber light that indicates the battle short is activated.

(ON CAG-42 & 43)

(13) Voltage Adjust Potentiometer: Adjusts generator set voltage.

(ON CAG-44 & 45)

(14) Synchronizing Lights: Indicates synchronization of units to be paralleled.

(ON CAG-46 & 47)

(15) AC Circuit Interrupter Switch: Opens and closes AC circuit interrupter relay. This switch serves the same purpose as the load contactor switch on the MIL-STD generator set.

(16) AC Interrupter Light: Green light indicates AC circuit interrupter is closed.

(ON CAG-48 & 49)

(17) Frequency Adjust Potentiometer: Adjust the frequency of the 30 kw and 60 kw generator sets only.

(ON CAG-50 & 51)

(18) Emergency Stop Push-button: Shuts down the generator set in emergency situations only.

(ON CAG-52 & 53)

(19) Parallel Unit Switch: Energizes or de-energizes paralleling circuits in the 30 kw and 60 kw generator sets only.

(ON CAG-54 & 55)

(20) Master Switch:

(a) OFF - De-energizes all circuits in the control cubicle except for the panel lights.

(b) PRIME & RUN AUX FUEL - Energizes generator set run circuits with the auxiliary fuel pumps operating.

(c) PRIME & RUN - Energizes generator set run circuits with auxiliary fuel system de-energized.

(d) START - Energizes the starter circuits.

(ON CAG-56 & 57)

(21) Oil Pressure Indicator: Indicates the oil pressure (normal 25 - 60 psi).

(ON CAG-58 & 59)

(22) Time Meter (Total Hours): Indicates total hours of time that the generator set has been in operation.

(ON CAG-60 & 61)

(23) Battery Charge Ammeter: Indicates charge/discharge rate of batteries.

(ON CAG-62-65)

(24) Battery Charger Fuse: Located on the controls bracket assembly and protects the battery charging alternator from overload.

(ON CAG-66 & 67)

(25) Reactive Current Adjust Rheostat: Located on the control bracket assembly, it adjusts the current for load sharing requirements, while generator set is in parallel operation. **(Applies to the 30kw and 60kw generator sets only).**

(ON CAG-68 & 69)

(26) Load Sharing Adjust Rheostat: Located on the controls bracket assembly, it adjusts the power for load sharing requirements while generator set is in parallel operations. **(Applies to the 30kw and 60kw generator sets only).**

(ON CAG-70 & 71)

(27) Over-speed Reset Switch: Located on the controls bracket assembly, it resets the generator set after an over-speed condition has occurred.

(ON CAG-72 & 73)

(28) Frequency Selector Switch: Located on the controls bracket assembly, it allows the selection of 50 Hz or 60 Hz. **(Applies to MEP-805 and MEP-806 generator sets only).**

(ON CAG-74 & 75)

(29) DC Manual Power Circuit Breaker: Located on the controls bracket assembly, it energizes or de-energizes the DC circuits. It also protects the DC circuits from possible short circuits.

(ON CAG-76 & 77)

(30) Manual Speed Control: Applies to the MEP-803/813 generator sets only and permits engine speed adjustments through the actions of a utility governor. Adjustments to the speed are made depressing the button and pulling out or pushing in the control. Fine adjustments are made by rotating the vernier knob. The frequency of the unit increases as the speed of the engine increases.

(ON CAG-78 & 79)

(31) NATO Slave Receptacle: The slave receptacle is located on the right front of the generator set and is used to jump-start the generator or for remote battery operations. **(On the MEP-803/813 it is located on the right side).**

(ON CAG-80 & 81)

(32) Paralleling Receptacle: The paralleling receptacle is located to the left of the control panel. It is used to connect the paralleling cable between two generators of the same size and mode to operate in parallel.

(ON CAG-82 & 83)

(33) Convenience Receptacle: The convenience receptacle is located to the left side of the control panel. It operates any small plug-in type equipment requiring 120 VAC/15 Amps.

(ON CAG-84 & 85)

(34) Diagnostic Connector: The diagnostic connector is located to the left side of the control panel. It is a multi-pin plug that is wired to specific points in the generator sets electrical system. This enables monitoring and troubleshooting of the generator set operation.

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK.

(35) Fault Indicator Panel:

(ON CAG-86)

(a) Fault Indicator Panel: The malfunction indicator panel is located to the left of the control panel assembly and indicates malfunctions of the generator set components.

(ON CAG-87)

(b) Low Oil Pressure Indicator Illuminates when engine lubrication system's pressure is less than 15 ± 3 psi during operation.

(ON CAG-88)

(c) No Fuel Indicator: Illuminates when fuel level in the fuel tank is below preset level (approximately 4 minutes of fuel remaining in the fuel system).

(ON CAG-89)

(d) Coolant High Temperature Indicator: Illuminates if engine coolant exceeds 225 ± 5 degF.

(ON CAG-90)

(e) Over voltage Indicator: Illuminates when voltage in 120 volt generator coil exceeds 153 ± 3 VAC.

(ON CAG-91)

(f) Over speed Indicator: Illuminates if engine speed exceeds 2200 ± 40 rpm.

(ON CAG-92)

(g) Reverse Power Indicator: Illuminates when reverse power exceeds 20 ± 3 percent of the rated load.

(ON CAG-93)

(h) Overload Indicator: Illuminates when the load on any phase reaches 130 percent of the rated load and the overload protective device activates.

(ON CAG-94)

(i) Ground Fault Circuit Interrupter Test Button: Tests ground fault circuit interrupter .

(j) Ground Fault Circuit Interrupter Reset Button: Resets the ground fault circuit interrupter.

(k) Ground Fault Circuit Interrupter: Indicates that a ground fault condition has occurred in the convenience receptacle. If a red bar is not present, a ground fault condition has occurred in the convenience receptacle.

(ON CAG-95)

(l) Short Circuit Indicator: Illuminates when generator set output in any phase exceeds 425 ± 25 percent of the rated current.

(ON CAG-96)

(m) Under volt: Illuminates when voltage drops below 99 ± 4 VAC in any 120-volt generator coil winding.

(ON CAG-97)

(n) Push Test/Reset Lamps: Test and resets fault indicator lamps.

(PRACTICE/PROVIDE HELP):

(30 MIN)

HAVE STUDENTS GO OUT TO THE TQG'S AND IDENTIFY THE DIFFERENT TQG INSTRUMENTS, CONTROLS AND THE FAULT INDICATOR PANEL. AFTER THIS IS COMPLETE GIVE THE CLASS A TEN-MINUTE BREAK.

TRANSITION: On what TQG generators does the Frequency Adjust Potentiometer control the frequency? Now lets look at the components of the Tactical Quiet Generator set(s).

(ON CAG-98)

3. Tactical Quiet Generator Set Components:

(70 MIN)

(ON CAG-99-101)

(1) Engine: The engine is a 4 cycle, fuel injected, turbo charged, liquid cooled diesel engine that occupies the front half of the generator set. The engine is equipped with a fuel filter/water separator, oil filter and an air cleaner assembly. Protection devices automatically stop the engine during conditions of high coolant temperature (225 ± 5 degF), low oil pressure (15 ± 3 psi), no fuel, over speed (2200 ± 40 rpm) and over voltage (153 ± 3 VAC).

(ON CAG-102 & 103)

(2) Radiator: The radiator acts as a heat exchanger for the engine coolant.

(ON CAG-104 & 105)

(3) Muffler: The muffler and exhaust tubing are connected to the turbocharger on the engine. The exhaust exits from the top of the generator set housing with the gases exhausting upward.

(ON CAG-106 & 107)

(4) Starter: The starter is an electric cranking motor that mechanically engages the engine's flywheel in order for the engine to start.

(ON CAG-108 & 109)

(5) Battery Charging Alternator: The battery charging alternator maintains a 24VDC charge on the batteries and the control circuits.

(ON CAG-110 & 111)

(6) Batteries: The two batteries are connected in series. They are electrolyte serviceable, lead acid, 12VDC type. After starting, the generator set is capable of operating with the batteries removed. A diode located behind the control panel protects the generator set if the batteries are connected incorrectly.

(ON CAG-112-114)

(7) Air Cleaner Assembly: The air cleaner consist of a dry-type, disposable paper filter housed in a canister. The air cleaner assembly features a dust collector that traps large dust particles. It has a restriction indicator that will pop up during operation when the air cleaner requires servicing.

(ON CAG-115 & 116)

(8) Fuel Tank: The fuel tank has the capacity to hold sufficient fuel for at least 8 hours of operation. The fuel tank houses the auxiliary fuel pump switch, the fuel level gauge transmitter and low fuel shut down switch.

(ON CAG-117 & 118)

(9) AC Generator: The AC generator is a single bearing, drip proof, synchronous, brush less, three phases, air-cooled generator. The generator is coupled directly to the rear of the diesel engine.

(ON CAG-119 & 120)

(10) Load Output Terminal Board: The load output terminal board consist of four AC output terminals mounted on a board. These terminals are labeled L1, L2, L3 and L0. There is a fifth terminal marked GND that serves as the equipment ground. A removable solid copper bar is connected between the L0 and GND terminals.

(ON CAG-121 & 122)

(14) Skid Base: The skid base supports the generator set. They have forklift access openings with cross members for short distance movement. The skid base has provisions on the bottom for installation of the generator set on a trailer.

(ON CAG-123 & 124)

(15) AC Voltage Reconnection Terminal Board: The reconnection board allows reconfiguration from 120/208 (low wye) to 240/416 (high wye) VAC output.

(ON CAG-125 & 126)

(16) Fuel Filter/Water Separator: The fuel filter/water separator is used to remove impurities and water from the diesel fuel.

(ON CAG-127 & 128)

(17) Dipstick: The dipstick is used to indicate the level of oil in the engine crankcase when the engine is running or stopped.

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK

(ON CAG-129 & 130)

(18) Oil Filter: The oil filter removes impurities from the lubrication system.

(ON CAG-131 & 132)

(19) Fan Belt: The fan belt is used to drive the fan, the water pump, and the battery-charging alternator.

(ON CAG-133 & 134)

(20) Water Pump: The water pump is located on the front of the engine and circulates the engine coolant through the engine block and the radiator. It is driven by the fan belt.

(ON CAG-135-137)

(21) Dead Crank Switch:

(a) The switch in the OFF position prevents the batteries from discharging by disconnecting them from the control circuits.

(b) The switch in the CRANK position allows the engine to be turned over without energizing any of the run circuits. This is used for maintenance purposes.

(c) The switch in the NORMAL position energizes the control panel control circuits for normal operations.

(d) While the generator is running, is important that the switch is not placed in the CRANK position. This will allow the

starter to engage the flywheel of the engine causing serious damage to the generator set.

(ON CAG-138 & 139)

(25) Coolant High Temperature Switch: The coolant high temperature switch provides automatic shut down in the event that the coolant temperature exceeds 225 ± 5 degF.

(ON CAG-140 & 141)

(26) Low Oil Pressure Switch: The low oil pressure switch provides automatic shut down in the event that the oil pressure drops dangerously low.

(ON CAG-142 & 143)

(27) Coolant Temperature Sender: The coolant temperature sender senses the temperature of the coolant in the engine.

(ON CAG-144 & 145)

(28) Oil Pressure Sender: The oil pressure senses the oil pressure in the engine.

(ON CAG-146 & 147)

(29) Radiator Fill Bottle: The radiator fill bottle it has a cold and hot level marked on the side of the container. This is the only place where authorized personnel will add coolant to the engine as required.

(ON CAG-148 & 149)

(30) AC Circuit Interrupter Relay: The AC circuit interrupter relay enables or interrupts the power flow between the voltage reconnection board and the output load terminals.

(ON CAG-150 & 151)

(31) Magnetic Pickup: The magnetic pickup utilizes magnetic impulses to monitor engine speed for the governor control unit.

(ON CAG-152 & 153)

(32) Actuator: The actuator regulates the amount of fuel that enters the engine. This will increase or decrease the engine speed.

(ON CAG-154 & 155)

(33) Fuel Injection Pump: The fuel injection pump delivers a metered amount of fuel to each cylinder.

(ON CAG-156 & 157)

(34) Fuel Solenoid Valve: The fuel solenoid is located on the left side of the engine and is mounted directly onto the fuel injection pump. The solenoid valve (also referred to as the fuel shutoff solenoid) prevents fuel from entering the fuel injection pump when 24 VDC is removed from the input terminals.

TRANSITION: What is the purpose of the Actuator? Now lets look at the components locations on the Tactical Quiet Generator set(s).

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK.

4. Tactical Quiet Generator Set Component Locations: (50 MIN)

(INSTRUCTOR NOTE): THE INSTRUCTOR WILL POINT OUT EACH COMPONENT AS IT IS COVERED.

DEMONSTRATION:

(20 MIN)

- (1) Engine: The engine occupies the front half of the generator set, and is the largest part of the generator set.
- (2) Radiator: The radiator is located in the front of the engine compartment, and is not visible from the out side of the generator set.
- (3) Muffler: The muffler and exhaust tubing are connected to the turbocharger on the engine. The exhaust is located on the top of the generator set.
- (4) Starter: The starter is located on the right side of the engine compartment, it has 8 wires connected to it.
- (5) Battery Charging Alternator: The battery charging alternator is located on the right side of the engine, and has a belt attached to a pulley to allow it to operate.
- (6) Batteries: The batteries are located in the front of the generator set. The two batteries are connected in series
- (7) Air Cleaner Assembly: The air cleaner assembly is located under the control panel behind the air cleaner access door.
- (8) Fuel Tank: The fuel tank is located under the engine assembly between the skid base side members.
- (9) AC Generator: The generator is coupled directly to the rear of the diesel engine.
- (10) Load Output Terminal Board: The load output terminal board is located on the right rear of the generator housing and consist of four AC output terminals mounted on a board.
- (14) Skid Base: The skid base supports the generator set. They have forklift access openings with cross members for short distance movement.
- (15) AC Voltage Reconnection Terminal Board: The reconnection board is located on the right rear side of the generator and is above the Output Box Assembly.
- (16) Fuel Filter/Water Separator: The fuel filter/water separator is located on the right in the engine compartment.
- (17) Dipstick: The dipstick is located on the right side of the engine compartment, it is shaped just like a dipstick on a car.
- (18) Oil Filter: The oil filter is located in the right side of the engine compartment, and looks like a standard oil filter on a car.

(19) Fan Belt: The fan belt is located on the front of the engine, it is attached to the fan pulley and alternator.

(20) Water Pump: The water pump is located on the front of the engine, and it also has the fan mounted to it.

(21) Dead Crank Switch: The dead crank switch is located on the left side of the engine compartment.

(25) Coolant High Temperature Switch: The coolant high temperature switch is located on the left side of the engine near the upper radiator hose.

(26) Low Oil Pressure Switch: The low oil pressure switch is located on the left side of the engine below the fuel injection pump.

(27) Coolant Temperature Sender: The coolant temperature sender is located on the left side of the engine on top in the cylinder head.

(28) Oil Pressure Sender: The oil pressure sender is located on the left side of the engine below the fuel injection pump

(29) Radiator Fill Bottle: The radiator fill bottle is located on the right side of the engine.

(30) AC Circuit Interrupter Relay: The AC circuit interrupter relay is located inside the same compartment as the voltage reconnection board.

(31) Magnetic Pickup: The magnetic pickup is located on the rear bell housing of the engine flywheel.

(32) Actuator: The actuator is located on the left side of the engine.

(33) Fuel Injection Pump: The fuel injection pump is located on the left side of the engine.

(34) Fuel Solenoid Valve: The fuel solenoid is located on the left side of the engine and is mounted directly onto the fuel injection pump.

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK.

(PRACTICE/PROVIDE HELP): HAVE THE STUDENTS IDENTIFY ALL THE COMPONENTS ON EACH OF THE TQG'S. (90 MIN)

TRANSITION: Where is the Magnetic Pickup located? Now lets move on to the actual operations of the TQG generators.

(ON CAG-158)

5. Before Operations Checks:

(50 MIN)

a. A before operations check is exactly what it sounds like...certain checks which are performed BEFORE we operate a particular item of equipment. This is also known as a 360, since 360 degrees is a complete circle. As the operator you will do a complete tour around the equipment visually inspecting for, the first and most important thing to do is:

(ON CAG-159)

(1) Inspect ground rod and generator ground stud to ensure proper grounding.

NOTE: FAILURE TO DO SO CAN RESULT IN DEATH OR SERIOUS BODILY INJURY BY ELECTROCUTION

(ON CAG-160)

(2) Housings, air ducts, exhaust grills, door fasteners and hinges.

NOTE: THE GENERATOR IS DEADLINED IF THE DOORS WILL NOT SECURE.

(ON CAG-161)

(3) Identification plates are secured and in place.

(ON CAG-162)

(4) Skid bases are not corroded or cracked.

(ON CAG-163)

(5) Acoustical materials are not missing or damaged.

(ON CAG-164)

(6) Engine compartment is not damaged, loose or missing components.

(ON CAG-165)

(7) Fuel system for leaks, damaged, loose or missing parts.

NOTE : ANY LEAKS OR OTHER DISCREPANCIES DEADLINE THE GENERATOR

(ON CAG-166)

(8) Fuel filter/water separator drain off water and other contaminants.

(ON CAG-167)

(9) Ether start system for missing or loose hardware.

(ON CAG-168)

(10) Lubrication system leaks, oil level or oil contamination.

NOTE: IF ANY CLASS III LEAKS ARE PRESENT THE GENERATOR IS DEADLINE

(ON CAG-169)

(11) Radiator cap and hoses for cracks and leaks.

NOTE: THE GENERATOR IS DEADLINE IF CLASS III LEAKS ARE PRESENT

(ON CAG-170)

(12) Check cooling fan for damage or looseness.

NOTE: IF FAN IS DAMAGED OR LOOSE GENERATOR IS DEADLINE

(ON CAG-171)

(13) Check fan belt for cracks, fraying and looseness.

NOTE: GENERATOR IS DEADLINE IF BELT IS BROKEN OR MISSING

(ON CAG-172)

(14) Radiator coolant bottle for leaks and proper level of coolant.

NOTE: GENERATOR IS DEADLINE IF A CLASS III LEAK IS PRESENT

(ON CAG-173)

(15) Check muffler for leaks and exhaust system for corrosion, damage or missing parts.

NOTE: GENERATOR IS DEADLINE IF A DISCREPANCY EXIST

(ON CAG-174)

(16) Air cleaner element or assembly for damage or restrictions.

NOTE: GENERATOR IS DEADLINE IF CLOGGED ELEMENT IS INDICATED OR PIPING CONNECTIONS ARE LOOSE

(ON CAG-175)

(17) Check battery electrolyte level.

NOTE: 803/813 GENERATORS HAVE MAINTENANCE FREE BATTERIES

(ON CAG-176)

(18) Check batteries for damaged, loose or corrosion on connections and cables.

NOTE: GENERATOR IS DEADLINE IF CABLES ARE LOOSE, DAMAGED OR MISSING

(ON CAG-177)

(19) Check Output Box Assembly for loose or damaged wiring or cables.

NOTE: IF CABLES, WIRES OR HARDWARE ARE DAMAGED, THE UNIT IS DEADLINE UNTIL REPAIRS ARE MADE

(ON CAG-178)

(20) Check all indicators and controls for damaged or missing parts.

NOTE: IF A DISCREPANCY EXISTS, THEN THE UNIT IS DEADLINE

(ON CAG-179)

(21) Check the control box harnesses for loose or damaged wiring.

NOTE: IF A DISCREPANCY EXISTS, THEN THE UNIT IS DEADLINE

(ON CAG-180)

(22) Inspect the parallel cable and connectors for damage if the generator will be used for paralleling.

TRANSITION: Now that we have completed the before operations checks we can now begin the starting procedures. What is the first and most important thing you as the operator must check before starting the generator?

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK.

(ON CAG-181)

6. Starting Procedures:

(50 MIN)

Now that the before operations checks are complete, we can now begin the starting procedures.

(ON CAG-182)

(1) Turn the deadcrank switch to the normal position.

(ON CAG-183)

(2) Ensure DC Control Power circuit breaker is pushed in. The DC Control circuit breaker should always be pushed in. If the DC Control Circuit Breaker is out, push it in. If the breaker pops back out, a short has occurred in the DC control circuits. STOP and notify the maintenance chief.

(ON CAG-184)

(3) On the 805 & 806A models, place the Frequency Select switch to the proper position (50 or 60 HZ). Mep 815 & 816A model generators do not have a frequency selector switch, since they are 400 hz generators.

(ON CAG-185)

(4) On the 803/813A ensure AC voltage reconnection switch is positioned to match voltage requirements. On 805/815A & 806/816A ensure the reconnection board is positioned to match voltage requirements.

(ON CAG-186)

(5) Place AM-VM transfer switch in a position corresponding to output terminal load connections.

(ON CAG-187)

(6) On 805/815A & 806/816A models, place Unit Parallel Unit switch in Unit position. The 803/813A models do not have this switch because they cannot be paralleled.

(ON CAG-188)

(7) Place Master Switch to Prime and Run position.

(ON CAG-189)

(8) Push Press To Test lamps on both the control panel as well as the malfunction indicator panel.

(ON CAG-190)

(9) At temperatures below 40°F place the Master Switch to Preheat for 30 seconds. This applies to the 803/813A models. On 805/815A & 806/816A models, it may be necessary to use the ether switch. This switch can only be activated while the master switch is in the start position.

(ON CAG-191)

(10) Rotate the Master Switch to Start position. CAUTION: Do not allow the starter to crank for more than 15 seconds. Allow at least 15 seconds in between cranking in order for the starter motor to cool.

(ON CAG-192)

(11) Hold the Master Switch in the start position until oil pressure reaches at least 25 psi, voltage has increased to its approximate rated value and the engine has reached stable operating speed. On the 805/815A & 806/816A models, hold the switch in the start position until the engine stops hunting (engine speed stabilizes).

(ON CAG-193)

(12) Release Master Switch to Prime and Run position. If operating with an auxiliary fuel source, rotate Master Switch to Prime and Run Aux Fuel position.

(ON CAG-194)

(13) Press Ground Fault Circuit Interrupter Test pushbutton. Ensure indicator window is clear. Press Reset push-button and ensure indicator is red.

(ON CAG-195)

(14) Rotate the AM-VM transfer switch to each phase position while observing ammeter (Percent Rated Current meter). If more than rated load (100%) is indicated in any phase, reduce load.

TRANSITION: So far we have looked at before operations checks, and proper starting procedures. What is the first step in the starting procedures? Now that the generator is running, we must conduct a during operation check. Let's see what is involved in that.

(INSTRUCTOR NOTE: ONCE ALL THE STUDENTS HAVE HAD A CHANCE TO ASK QUESTIONS PLACE THEM ALL ON A TEN-MINUTE BREAK.)

(ON CAG-196)

7. During Operations Checks:

(60 MIN)

A during operations check will be accomplished DURING the operation of the particular generator. Inspecting for, but not limited to:

(ON CAG-197)

(1) Check doors, panels, hinges and latches for damaged, loose or corroded items. Inspect the air intake and exhaust grills for debris.

NOTE: IF THE DOORS CANNOT BE SECURED, THE GENERATOR COULD OVERHEAT AND MUST BE REPORTED DEAD LINED

(ON CAG-198)

(2) Check the engine compartment for loose, damaged or missing hardware.

(ON CAG-199)

(3) Inspect the fuel system for leaks, damaged, loose or missing parts.

NOTE: IF A CLASS III LEAK EXISTS, THEN THE UNIT IS DEADLINE

(ON CAG-200)

(4) Inspect the lubrication system for leaks, damaged, loose or missing parts. Also inspect the engine oil level and oil for contamination.

NOTE: IF A CLASS III LEAK EXISTS OR ENGINE OIL SHOWS SIGNS OF CONTAMINATION, THEN THE UNIT IS DEADLINE. IF THE OIL LEVEL IS LOW, ADD OIL

NOTE: ON THE MEP 803/813 GENERATORS YOU CANNOT CHECK THE ENGINE OIL LEVEL WHILE THE GENERATOR IS RUNNING

(ON CAG-201)

(5) Check for unusual noises from the fan area.

(ON CAG-202)

(6) Ensure all indicators on the control box assembly are operating properly.

NOTE: IF THE FREQUENCY METER OR THE AC VOLTMETER ARE INOPERATIVE, THEN THE GENERATOR IS DEADLINE

(ON CAG-203)

(7) **VISUALLY** inspect the output box assembly connections for arcing.

NOTE: IF ARCING EXIST, THEN THE GENERATOR MUST BE SHUT DOWN IMMEDIATELY!

(ON CAG-204)

(8) **VISUALLY** inspect the grounding connections for tightness.

NOTE: THE GENERATOR IS DEADLINE IF THE CONNECTIONS ARE NOT SECURE.

(ON CAG-205)

(9) If too much vibration is noticed, shut down the generator and report it deadlined to the floor chief.

(ON CAG-206)

(10) If the engine lacks power, shut down the generator and report it to the floor chief.

(ON CAG-207)

(11) If excessive smoke comes from the exhaust, first check the air filter indicator, and if the indicator shows no restrictions, then shut down the generator and report it to the floor chief.

(ON CAG-208)

(12) If the engine fails to respond to the controls shut down the generator. If the generator fails to shut down, press the Emergency Stop Button. Once the generator shuts down report it to the floor chief.

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK.

(ON CAG-209 & 210)

(13) On 803/813A models using the Frequency Adjust Control, adjust to the proper frequency. On the 805/815A & 806/816A models, adjust the Frequency Adjust Potentiometer to the proper frequency.

(ON CAG-211 & 212)

(14) Using the Voltage Adjust Potentiometer, adjust the voltage to 120/208 or 240/416 for using equipment voltage requirements.

(ON CAG-213 & 214)

(15) This is done by placing the AC Circuit Interrupter Switch to Closed position.

(ON CAG-215)

(16) After the AC Circuit Interrupter has been placed in the closed position, recheck the output voltage, output current and frequency. Adjust as required.

(ON CAG-216)

NOTE: LET THE ENGINE RUN FOR AT LEAST 5 MINUTES BEFORE CONTACTING THE LOAD. HOWEVER, THE LOAD CAN BE APPLIED IMMEDIATELY IF NEEDED

(ON CAG-217 & 218)

(17) By placing the AC Circuit Interrupter Switch in the Open position this will cut the power that flows to the load studs. The generator must be ran for five minutes to allow for proper cool down.

TRANSITION: So far we have looked at during operations checks, and proper starting procedures. What items are we allowed to physically check during the during operations check.

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK.

(ON CAG-219)

8. Shut Down Procedures:

(10 MIN)

(1) Allow generator set to operate five minutes with no load applied. This allows the engine to cool down.

(ON CAG-220)

(2) Place the master switch in the OFF position.

(ON CAG-221)

(3) Pull out the DC circuit power breaker.

(ON CAG-222)

(4) Zero out the generator, by turning the voltage and frequency adjust potentiometer down to zero.

(ON CAG-223)

(5) Place Dead Crank switch to OFF position.

(ON CAG-224)

(6) Disconnect all cables from load output box

NOTE: FOR EMERGENCY SHUTDOWN, PUSH IN EMERGENCY STOP

TRANSITION : Now that the generator is finished running an after operations check must be done. How long must you allow the generator to run once the AC circuit interrupter is placed in the open position?
3 to 5 minutes

(ON CAG-225 & 226)

9. After Operations Checks:

(20 MIN)

(ON CAG-72)

An After Operations Check will be accomplished AFTER the generator set has been shut down. An After Operations Check consists of all of the before ops checks, ensuring the generator is properly shut down, and ensuring all of the major components are functional and serviceable.

(INSTRUCTOR NOTE: OPERATORS ARE CAUTIONED NOT TO REMOVE THE RADIATOR CAP, AND IF THE GENERATOR REQUIRES COOLANT, ONLY ADD IT TO THE COOLANT OVER-FLOW BOTTLE. GIVE THE STUDENTS A 10-MINUTE BREAK.)

DEMONSTRATION:

(60 MIN)

(INSTRUCTOR NOTE: INSTRUCTOR WILL PERFORM ALL ASPECTS OF TACTICAL QUIET GENERATOR SET OPERATIONS ON ALL THE VARIOUS TACTICAL QUIET GENERATOR SETS.)

During this time, the students will be observing as the instructor demonstrates the proper operation of all Tactical Quiet Generator sets.

(INSTRUCTOR NOTE): GIVE THE STUDENTS A 10-MINUTE BREAK.

PRACTICE / PROVIDE HELP:

(380 MIN)

(INSTRUCTOR NOTE: NO BREAKS ARE NECESSARY DURING PRACTICAL APPLICATION, BECAUSE ONE STUDENT IS ON A GENERATOR AT A TIME.)

1. Following the demonstration, the remaining time will be spent allowing the students to get some "hands on" experience with the generator sets.
2. The class will be broken down into smaller groups and each group will perform all operation checks. Also each group will start, operate and shut down the generator sets.
3. All groups will be given an equal amount of time to become familiar with the generator sets.
4. During the practical application, the instructor will supervise the operation of the generator sets by the students. If more than one generator set is used for practical application, the appropriate

amount of assistant instructors will be required. This is to insure the proper and safe operation of the generator sets.

SUMMARY:

(5 MIN)

To this point we covered how to perform before, during, and after operation checks on a Tactical Quiet Generator sets. Those students with the instructional rating forms fill them out and turn them in to the back of the class, everyone else take a 10-minute break.

INSTRUCTOR NOTE : GIVE THE CLASS A TEN MINUTE

REFERENCES: TM 09244A/09245A
TM 09247A/09248A
TM 09249A/09246A

LIST OF SUPPORTING PAPERS

1. Student Outline

2. Computer Aided Graphics

CAG-1 TQG Operations
CAG-2 Overview
CAG-3 Learning Objectives
CAG-4 Evaluation
CAG-5 Characteristics of Tactical Quiet Generators
CAG-6 MEP-803 Characteristics
CAG-7 MEP-803 Picture
CAG-8 MEP-813 Characteristics
CAG-9 MEP-813 Picture
CAG-10 MEP-805 Characteristics
CAG-11 MEP-805 Picture
CAG-12 MEP-815 Characteristics
CAG-13 MEP-815 Picture
CAG-14 MEP-806 Characteristics
CAG-15 MEP-806 Picture
CAG-16 MEP-816 Characteristics
CAG-17 MEP-816 Picture
CAG-18 Control Panel Instruments of the Tactical Quiet Generator
CAG-19 Control Panel Picture
CAG-20 Fuel Level Indicator
CAG-21 Fuel Level Indicator
CAG-22 Panel Lights
CAG-23 Panel Lights
CAG-24 Coolant Temperature Indicator
CAG-25 Coolant Temperature Indicator
CAG-26 Ether Switch
CAG-27 Ether Switch
CAG-28 Panel Light Switch
CAG-29 Panel Light Switch
CAG-30 Frequency Meter

CAG-31 Frequency Meter
CAG-32 Ammeter
CAG-33 Ammeter
CAG-34 AM-VM Transfer Switch
CAG-35 AM-VM Transfer Switch
CAG-36 Kilowatt Meter
CAG-37 Kilowatt Meter
CAG-38 AC Voltmeter
CAG-39 AC Voltmeter
CAG-40 Battle Short Switch
CAG-41 Battle Short Switch
CAG-42 Voltage Adjust Potentiometer
CAG-43 Voltage Adjust Potentiometer
CAG-44 Synchronizing Lights
CAG-45 Synchronizing Lights
CAG-46 AC Circuit Interrupter
CAG-47 AC Circuit Interrupter
CAG-48 Frequency Adjust Potentiometer
CAG-49 Frequency Adjust Potentiometer
CAG-50 Emergency Stop Push-Button
CAG-51 Emergency Stop Push-Button
CAG-52 Parallel Unit Switch
CAG-53 Parallel Unit Switch
CAG-54 Master Switch
CAG-55 Master Switch
CAG-56 Oil Pressure Indicator
CAG-57 Oil Pressure Indicator
CAG-58 Time Meter
CAG-59 Time Meter
CAG-60 Battery Charge Ammeter
CAG-61 Battery Charge Ammeter
CAG-62 Behind the Control Cubicle
CAG-63 Battery Charger Fuse
CAG-64 Battery Charger Fuse
CAG-65 Battery Charger Fuse
CAG-66 Reactive Current Adjust Rheostat
CAG-67 Reactive Current Adjust Rheostat
CAG-68 Load Sharing Adjust Rheostat
CAG-69 Load Sharing Adjust Rheostat
CAG-70 Over-Speed reset Switch
CAG-71 Over-Speed reset Switch
CAG-72 Frequency Selector Switch
CAG-73 Frequency Selector Switch
CAG-74 DC Manual Power Circuit Breaker
CAG-75 DC Manual Power Circuit Breaker
CAG-76 Manual Speed Control
CAG-77 Manual Speed Control
CAG-78 NATO Slave Receptacle
CAG-79 NATO Slave Receptacle
CAG-80 Paralleling Receptacle
CAG-81 Paralleling Receptacle
CAG-82 Convenience Receptacle
CAG-83 Convenience Receptacle
CAG-84 Diagnostic Connector

CAG-85 Diagnostic Connector
CAG-86 Fault Indicator Panel
CAG-87 Low Oil Pressure Indicator
CAG-88 No Fuel Indicator
CAG-89 Coolant High Temperature Indicator
CAG-90 Over Voltage Indicator
CAG-91 Over Speed Indicator
CAG-92 Reverse Power Indicator
CAG-93 Overload Indicator
CAG-94 Ground Fault Circuit Interrupter test Button
CAG-95 Short Circuit Indicator
CAG-96 Under Volt
CAG-97 Push test/Reset Lamps
CAG-98 Tactical Quiet Generator Set Components
CAG-99 Engine
CAG-100 Engine
CAG-101 Engine
CAG-102 Radiator
CAG-103 Radiator
CAG-104 Muffler
CAG-105 Muffler
CAG-106 Starter
CAG-107 Starter
CAG-108 Battery Charging Alternator
CAG-109 Battery Charging Alternator
CAG-110 Batteries
CAG-111 Batteries
CAG-112 Air Cleaner Assembly
CAG-113 Air Cleaner Assembly
CAG-114 Air Cleaner Assembly
CAG-115 Fuel Tank
CAG-116 Fuel Tank
CAG-117 AC Generator
CAG-118 AC Generator
CAG-119 Load Output Terminal Board
CAG-120 Load Output Terminal Board
CAG-121 Skid Base
CAG-122 Skid Base
CAG-123 AC Voltage Reconnection Terminal Board
CAG-124 AC Voltage Reconnection terminal Board
CAG-125 Fuel Filter/Water Separator
CAG-126 Fuel Filter/Water Separator
CAG-127 Dipstick
CAG-128 Dipstick
CAG-129 Oil Filter
CAG-130 Oil Filter
CAG-131 Fan Belt
CAG-132 Fan Belt
CAG-133 Water Pump
CAG-134 Water Pump
CAG-135 Dead Crank Switch
CAG-136 Dead Crank Switch
CAG-137 Dead Crank Switch
CAG-138 Coolant High Temperature Switch

CAG-139 Coolant High Temperature Switch
CAG-140 Low Oil Pressure Switch
CAG-141 Low Oil Pressure Switch
CAG-142 Coolant Temperature Sender
CAG-143 Coolant Temperature Sender
CAG-144 Oil Pressure Sender
CAG-145 Oil Pressure Sender
CAG-146 Radiator Fill Bottle
CAG-147 radiator Fill Bottle
CAG-148 AC Circuit Interrupter Relay
CAG-149 AC Circuit Interrupter Relay
CAG-150 Magnetic Pickup
CAG-151 Magnetic Pickup
CAG-152 Actuator
CAG-153 Actuator
CAG-154 Fuel Injection Pump
CAG-155 Fuel Injection Pump
CAG-156 Fuel Solenoid Valve
CAG-157 Fuel Solenoid Valve
CAG-158 Before Operations Check
CAG-159 Inspect Ground
CAG-160 Inspect Housing
CAG-161 ID Plates
CAG-162 Skid Base
CAG-163 Acoustical Materials
CAG-164 Engine Compartment
CAG-165 Fuel System
CAG-166 Fuel Filter
CAG-167 Ether Start
CAG-168 Lubrication System
CAG-169 Radiator Cap
CAG-170 Check Cooling Fan
CAG-171 Check Fan Belt
CAG-172 Radiator Coolant Bottle
CAG-173 Check Muffler
CAG-174 Air Cleaner
CAG-175 Check Battery Electrolyte
CAG-176 Check Battery Connections
CAG-177 Check Output Box Assy
CAG-178 Check all Indicator Controls
CAG-179 Check Control Box Harnesses
CAG-180 Check Parallel Cable
CAG-181 Starting Procedures
CAG-182 Turn Dead Crank Switch
CAG-183 Push DC Control Power Circuit Breaker
CAG-184 Frequency Selector Switch
CAG-185 Check Voltage Reconnection Switch
CAG-186 Set Am-VM Transfer Switch
CAG-187 Set Parallel Unit Switch
CAG-188 Master Switch to Prime and Run
CAG-189 Test the Lamps on the Fault Indicator Panel
CAG-190 Master Switch to Preheat
CAG-191 Master Switch to Start Position
CAG-192 Hold Master Switch

CAG-193 release Master Switch
CAG-194 Test Ground Fault Circuit Interrupter
CAG-195 Set AM-VM Transfer Switch
CAG-196 During Operations Checks
CAG-197 Check Doors and Panels
CAG-198 Check Engine Compartment
CAG-199 Inspect the Fuel System
CAG-200 Inspect Lubrication System
CAG-201 Check For Unusual Noises
CAG-202 Check All Indicators
CAG-203 Visually Inspect Output Box
CAG-204 Visually Inspect Ground
CAG-205 Vibration
CAG-206 lack Of Power
CAG-207 Excessive Smoke
CAG-208 Engine Fails
CAG-209 Frequency Adjust
CAG-210 Frequency Adjust
CAG-211 Voltage Adjust Potentiometer
CAG-212 Voltage Adjust Potentiometer
CAG-213 Close AC Circuit Interrupter
CAG-214 Close AC Circuit Interrupter
CAG-215 Recheck Voltage
CAG-216 Let Engine Run
CAG-217 Open Load Contactor
CAG-218 Open Load Contactor
CAG-219 Shut Down Procedures
CAG-220 Master Switch Off
CAG-221 Pull DC Circuit Breaker
CAG-222 Zero Out Generator
CAG-223 Dead Crank Switch Off
CAG-224 Disconnect all Cables
CAG-225 After Operations
CAG-226 After Operations

LIST OF MEDIA/TRAINING AIDS

1. MEDIA TYPE (S) AND LOCATION:

a. Lesson plan - located in BB-50 Electrical section instructor area.

b. Student handouts - located in, BB-14 Academic sections back office. Student handouts are located in locker labeled Electronic Equipment Repair Specialist Course U-08.

c. Student Exams - located in, BB-14 Academic sections back office. Student exams are located in locker labeled Electronic Equipment Repair Specialist Course Exam U-08.

d. Computers - located in, BB-50, Electrical sections classrooms.

e. Computer aided graphics - located on computers in, BB-50, Electrical section classrooms under c/EERS Courseware/. Each presentation is saved under its lesson designator.

f. Publications - located in, BB-50, Electrical section instructor area.

2. TRAINING AIDS (S) AND LOCATION:

a. Actual Items - located at electrical section training area (BB-50).

b. Training aids - located in and around BB-50.

c. Tools - located in cage at BB-50.