

Summary Report for Individual Task
551-88L-3078
Troubleshoot Motor Controller
Status: Approved

Distribution Restriction: Approved for public release; distribution is unlimited.

Destruction Notice: None

Foreign Disclosure: FD5 - This product/publication has been reviewed by the product developers in coordination with the [installation/activity name] foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.

Condition: Given a motor controller aboard a vessel, at sea, at anchor or moored alongside a pier, day or night, under all sea and weather conditions, while wearing appropriate PPE, (i.e. hearing protection, Nitrile gloves, eye protection, etc.), lock out tag out kit and a marine rail tool box.

Standard: The Soldier correctly troubleshoots a motor controller aboard an Army vessel, IAW the appropriate Technical Manual and local SOPs, without injury to self or others and without damage to equipment.

Special Condition: None

Safety Risk: High

MOPP 4:

Task Statements

Cue: None

DANGER
None

WARNING
None

CAUTION
None

Remarks: None

Notes: None

Performance Steps

1. Demonstrate basic knowledge for troubleshooting continuity and circuit isolation of a motor controller.

a. When the troubleshooter is performing continuity checks, the circuit shows continuity when a resistance reading of less than one ohm is obtained.

b. When performing circuit isolation checks (open circuit), the circuit is open when a resistance reading of more than one megohm is obtained.

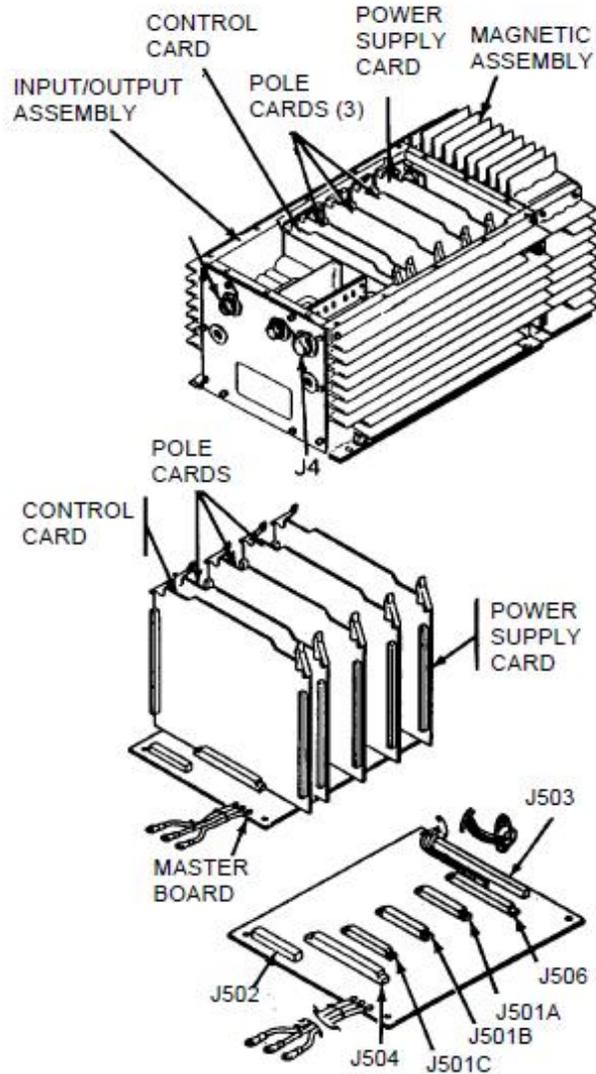
WARNING

High voltage is used to power this equipment. Connect a ground strap to motor controller chassis before applying power to avoid death or injury from electrical shock.

CAUTION

Discharge the capacitor assembly before removing pole or control cards. Otherwise, damage to cards or other motor controller components may result.

2. Demonstrate basic troubleshooting procedures of motor controller using diagram flow chart.



Master Board
Figure 551-88L-3078_01

a. Disassemble motor controller.

(1) Remove all five card assemblies from the master board.

(2) Inspect master board and the five card assemblies for burnt circuit paths, open foil paths, and missing solder.

(3) Were master board and all card assemblies free of deficiencies?

(a) NO

1 Replace defective master board or card assembly.

2 Perform functional test.

(b) YES

1 Discount magnetics assembly connector P301 from master board connector J503. Disconnect input/output assembly connector P201 from master board connector J502.

2 Inspect master board, all seven master board connectors, and mating connectors on card assemblies, magnetics assembly, and input/output assembly for the following deficiencies:

- _a_ Cracks or chips in master board or card assemblies.
- _b_ Bent or missing pins or deformed or missing connector sockets.
- _c_ Corrosion on pins or in connector sockets.
- _d_ Check each card to ensure it is properly seated into master board.

(4) Were all connectors and master board free of deficiencies.

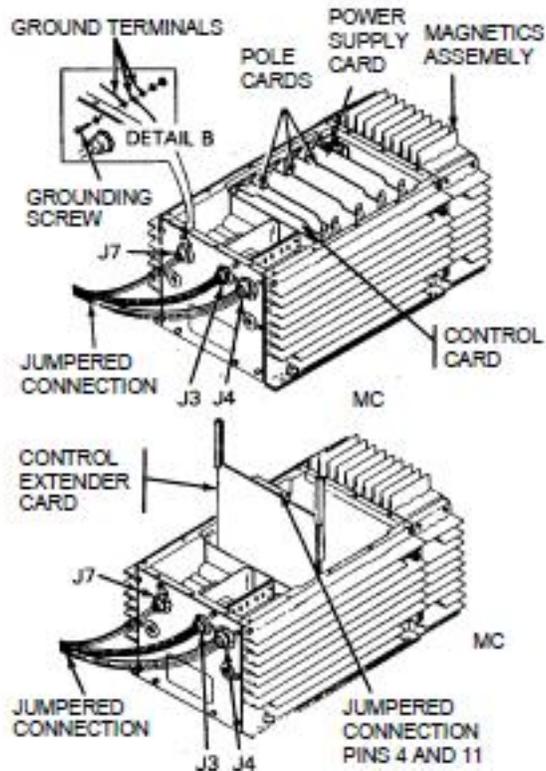
(a) NO

- _1_ Replace defective magnetics assembly, input/output assembly, circuit card(s), or master board.
- _2_ Perform functional test.

(b) YES

- _1_ Reconnect input/output assembly connector P201 to the master board connector J502.
- _2_ Reconnect magnetics assembly connector P301 to the master board connector J503.
- _3_ At power supply card, remove 1 inch wire between terminals. Reinstall all cards.
- _4_ Remove grounding screw and grounding terminals from motor controller chassis.
Note: Position grounding terminals so they are not in contact with motor controller chassis.

5 Jumper connector pins J7-A, J7-B, J7-C, J3-A J3-B, J3-D, J3-E, J3-F, J3-G J3-H, J3-J, J3-L, J3-M, J3-N J4-A, J4-B, J4-C, J4-D, J4-E J4-F, and J4-H together.



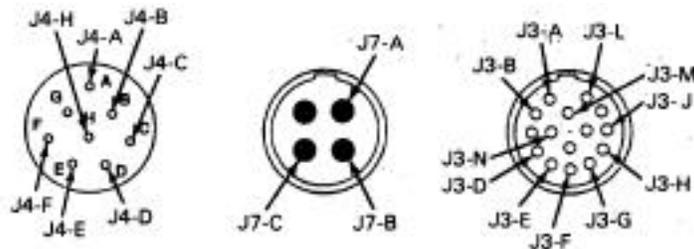
Motor Controller Diagram
Figure 551-88L-3078_

- _a_ Connect this set of conductors to the positive lead of insulation test set.
- _b_ Connect negative lead of test set to unpainted portion of motor controller chassis.
- _c_ Turn insulation test set on and adjust voltage to 250 Vac. Note leakage current indicator.

(5) Is leakage current less than 3 m A?

(a) NO

- _1_ Turn off test voltage from insulation test set.
- _2_ Remove power supply card, three pole cards, and control card from master board.
- _3_ Install control extender card into J504. Jumper pins 4 and 11 of control extender card.



Jumper Pins
Figure 551-88L-3078_

4 Turn on 250 Vac test voltage. Note leakage current indicator.

(b) YES

1 Turn off test voltage from insulation test set.

2 Turn off power from insulation test set and disconnect it from motor controller jumpered connection and chassis.

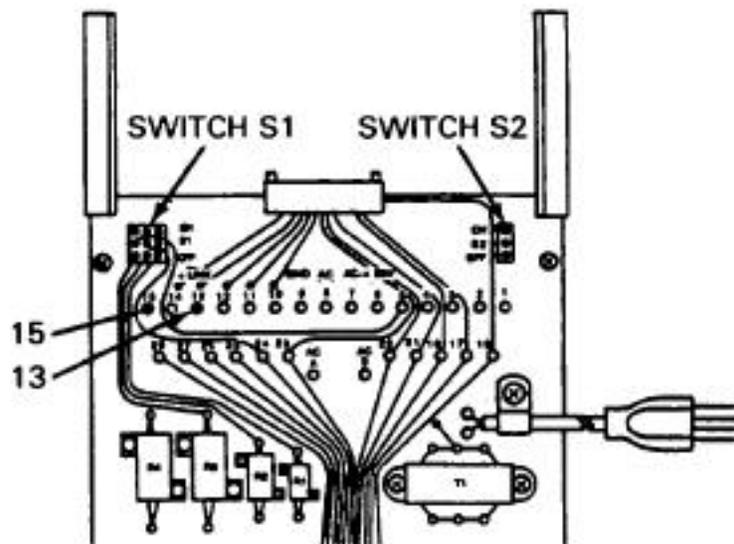
3 Disconnect jumpered connection from connectors J7, J3, and J4.

4 Remove three pole cards and control card.

5 Connect power supply card to extender card. DO NOT install power supply extender card into motor controller at this time.

Note: DO NOT plug ac power-cord of power supply extender card into ac outlet at this time. Ensure both switches S1 and S2 on the power supply extender board are in OFF position.

6 With a multimeter set to measure resistance, check between the following test terminals located on the power supply extender board: + LINK 13 - LINK 15.



Power Supply Extender Card
Figure 551-88L-3078_

(6) Was resistance reading between 190 and 210 ohms?

(a) NO

1 Replace power supply card.

2 Install replacement power supply card into the motor controller.

3 Install three pole cards and control card into the motor controller.

4 Reassemble motor controller. Perform functional test.

(b) YES

1 Measure the resistance between test terminals on power supply card.

Note: Readings will fluctuate, but will stay above 1 kilohm.

2 Perform functional test.

(7) Was continuity obtained for all checks?

(a) NO

1 Replace input/output assembly.

2 Install power supply card into the motor controller.

(b) YES

1 Remove three pole cards from master board.

2 Remove input/output assembly; Replace master board.

3 Install control card, three pole cards, and power supply card into the motor controller.

b. Reassemble motor controller; Perform functional test.

3. Demonstrate functional test for a motor controller.

Note: Before starting the functional test, ensure motor controller troubleshooting and repair has been performed. The unit is assembled and any test equipment' used during troubleshooting and repair is removed. To properly perform this functional test, the motor controller must be under load.

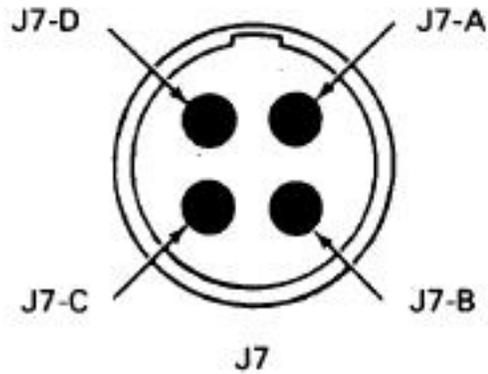
a. Connect an autotransformer to connector J7 as follows:

(1) J7-A Variable voltage

(2) J7-B AC neutral

(3) J7-C Safety ground

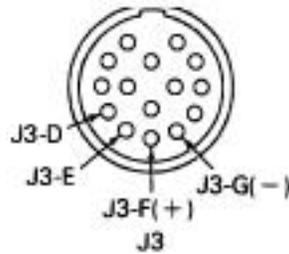
Note: Ensure that the variable autotransformer is set to provide zero or minimum output.



Motor Controller (Connector 17)
Figure 551-88L-3078_

b. Set power switch on variable dc power supply to ON. Adjust output to 3.0 volts dc. Turn off dc power supply.

c. Connect negative dc lead of the variable dc power supply to J3-G of the motor controller. Connect positive lead of the variable dc supply to J3-F of the motor controller.



Motor Controller (Connector 17)
Figure 551-88L-3078_

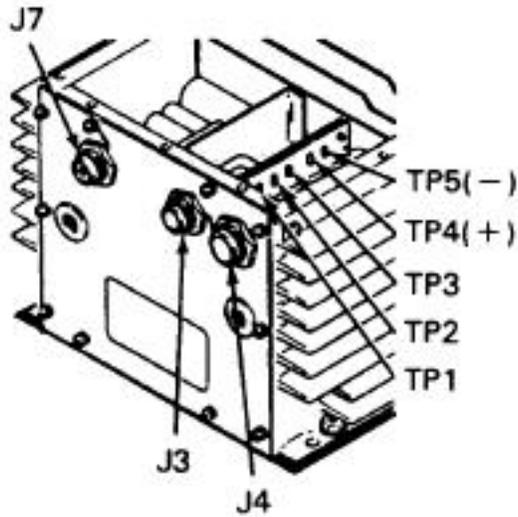
d. Set power switch on autotransformer to ON. Monitor autotransformer output current. VERY SLOWLY increase autotransformer ac voltage until the current reaches 2 amps OR until the voltage reaches 120 volts ac.

e. Place a jumper wire between J3-D and J3-E.

f. Disassemble MC test point cover. With a true RMS multimeter, measure ac voltage between the following test points:

- (1) TP1 and TP2
- (2) TP1 and TP3
- (3) TP2 and TP3

g. Measure dc voltage between the following test points, TP4(+) and TP5(-).



Motor Controller (Test Points)
Figure 551-88L-3078_

h. Set power switch to ON.

i. Adjust the dc power supply to provide an output of between 9.9 and 10.1 volts dc.

j. With a true RMS meter, measure ac voltage between the following test points:

(1) TP1 and TP2

(2) TP1 and TP3

(3) TP2 and TP3

k. Decrease dc power supply voltage to zero. Turn off dc power supply. Remove jumper between J3-D and J3-E.

l. Decrease autotransformer ac output voltage to zero. Turn off autotransformer. Disconnect all connections to J3, J4, and J7 of Motor Controller.

(Asterisks indicates a leader performance step.)

Evaluation Guidance: None

Evaluation Preparation: None

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Demonstrated basic knowledge for troubleshooting continuity and circuit isolation of a motor controller.			
2. Demonstrated basic troubleshooting procedures of motor controller using diagram flow chart.			
a. Disassembled motor controller.			
b. Reassembled motor controller.			
3. Demonstrated functional test for a motor controller.			

Supporting Reference(s):

Step Number	Reference ID	Reference Name	Required	Primary
	TM 3-4240-302-30&P-9	INTERMEDIATE DIRECT SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR MOTOR CONTROLLER (NSN 6110-01-292-7777)	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.

Safety: In a training environment, leaders must perform a risk assessment in accordance with ATP 5-19, Risk Management. Leaders will complete the current Deliberate Risk Assessment Worksheet in accordance with the TRADOC Safety Officer 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.

Prerequisite Individual Tasks : None

Supporting Individual Tasks : None

Supported Individual Tasks : None

Supported Collective Tasks : None

ICTL Data :

ICTL Title	Personnel Type	MOS Data
88L30 Watercraft Engineer	Enlisted	MOS: 88L, Skill Level: SL3, Duty Pos: TFR, LIC: EN
88L40 Watercraft Engineer	Enlisted	MOS: 88L, Skill Level: SL4, Duty Pos: TGB, LIC: EN, SQI: O