

## SECTION 5: TROUBLESHOOTING AND MAINTENANCE

### 5-1 LEVEL OF REPAIR

This manual is written based on the assumption that only unit-level troubleshooting will be performed. If the cause of a malfunction is traced to a Digitrip OPTIM Trip Unit, the device should be replaced. The malfunctioning device may be returned to Cutler-Hammer for further evaluation.

### 5-2 TROUBLESHOOTING

OPTIM Trip Units can be used with or without auxiliary power. In addition, guidelines can vary to some degree by circuit breaker type. To make the guidelines of Table 5.1 as user friendly as possible, the troubleshooting table is divided by circuit breaker type, with and without auxiliary power.

### 5-3 TRIP UNIT REPLACEMENT

If a trip unit or a circuit breaker must be replaced, consult Cutler-Hammer for specific replacement instructions.

### 5-4 MAINTENANCE AND CARE

Except for the rating plug and the battery for the local indicator, the Digitrip OPTIM Trip Unit is designed to be a self contained and maintenance free device.

The Digitrip OPTIM Trip Unit should be stored in an environment that does not exceed the temperature range of -30° to +85°C. The environment should also be free of excess humidity. Store the device in its original packing material.

Table 5.1 Troubleshooting Guide (continued on next page)

Symptom	Probable Cause	Possible Solution(s)	References
<b>L and N-Frame Circuit Breakers with Auxiliary Power</b>			
Unit Status LED is not blinking at approximately a one second on-off duty cycle.	Auxiliary power is not present or is reversed.	Measure voltage at +30VDC and NEG on side terminal block to be 30 ± 3 volts. Check polarity.	Table A.1 Wiring Diagrams
	Open connection on breaker internal wiring.	Check orange and black wires on the side terminal block.	Table A.1 Wiring Diagrams
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3
As soon as auxiliary power is applied, instantaneous trip LED comes on and breaker trips if initially closed.	Rating plug is not installed or pins are not making good connection.	Install rating plug and/or check connections.	Para. 2-6 & 5-4.2
	Rating plug is open internally	Replace rating plug	Para. 5-4.2, Table 2.1
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3
LED does not come on when battery check button is pressed.	Battery installed backwards	Install correctly	Para. 5-4.1
	Dead battery	Replace battery	Para. 5-4.1, Table 2.2
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3

Table 5.1 Troubleshooting Guide (continued from previous page)

Symptom	Probable Cause	Possible Solution(s)	References
Power values are grossly in error (1050 Trip Units only).	Connections from PT Module to breaker not made or are incorrect.	Check connections	Table A.1 Wiring Diagrams
	Line frequency incorrect	Verify operating frequency with OPTIMizer.	I.B. 29C892, Para. 3-6
	Trip unit may be the problem	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3
"Connection Failure" displayed when OPTIMizer is plugged in.	<b>FIRST DISCONNECT AUXILIARY POWER TEMPORARILY, THEN CHECK THE FOLLOWING:</b>		
	OPTIMizer not working or cord not properly plugged into OPTIMizer.	Verify OPTIMizer operation on another breaker.	I.B. 29C892 Para. 2-2.2 & 3-2
	Cord not properly plugged into breaker.	Check connection. If unit status LED is blinking, connection is OK.	Para. 2-4.1
	Rating plug is not installed or is loose.	Instantaneous LED will be on. Install rating plug and/or check for loose connections.	Para. 2-6 & 5-4.2
	Rating plug is open internally	Instantaneous LED will be on. Replace rating plug.	Para. 5-4.2, Table 2.1
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3
	<b>RECONNECT AUXILIARY POWER</b>		
BIM will not communicate with trip unit.	Breaker address is > 32 (HEX)	Check address with OPTIMizer and change as required.	I.B. 29C892 Para. 3-5.1
	No auxiliary power	If possible, open breaker or reduce breaker current to <20% of frame rating. Then, check that unit status LED is blinking. If not, see first symptom in this table.	Symptom: "Unit Status LED is not blinking."
	Rating plug is not installed or is loose.	Instantaneous LED will be on. Install rating plug and/or check for loose connections.	Para. 2-6 & 5-4.2
	Rating plug is open internally	Instantaneous LED will be on. Replace rating plug.	Para. 5-4.2, Table 2.1
	Open INCOM connection	Check INCOM connections on side terminal block. The transmit LED should flash when there is communication. With INCOM connector unplugged, the resistance "looking into" the INCOM terminals should be approximately 2.5 ohms.	Table A.1 Wiring Diagrams
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3

Table 5.1 Troubleshooting Guide (continued from previous page)

Symptom	Probable Cause	Possible Solution(s)	References
Ground fault alarm unit does not operate on a ground fault.	Connections to ground fault alarm unit are incorrect.	Check connections	Table A.1 Wiring Diagrams
	Ground fault alarm is not operating	Press test button on ground fault alarm unit. Button should illuminate. If it does not, check that 120V is being supplied to unit. If it is, replace the ground fault alarm unit.	Table A.1 Instructions for ground fault alarm
	Breaker is not providing an alarm signal.	Temporarily disconnect the wires to L1 and L2 on the ground fault alarm unit. With these connections open, approximately 5 volts should appear between GF, AL and COM when the ground fault current exceeds pickup. On ground fault alarm breakers, this voltage will be present as long as pickup is exceeded. On ground fault trip breakers, this voltage appears only transiently after a trip and must be observed with an oscilloscope. If the voltage is not present, the problem may be in the breaker. Refer to Note 1 at the end of Table 5.1.	Table A.1 Instructions for ground fault alarm
Breaker trips on ground fault.	There actually is a ground fault	Find the location of the fault and remove it.	N.A.
	On four wire systems the neutral current sensor may not have the correct ratio or be properly connected.	(1) Check that the neutral sensor and neutral sensor connections on side terminal block are good. (2) Check that the neutral current sensor ratio matches the breaker. (3) Check that connections from the neutral current sensor to the breaker are not reversed polarity.	Table A.1 Wiring Diagrams
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3
Breaker trips too rapidly on ground fault or short delay (zone selective interlocking not used).	GOUT to GIN and/or SOUT to SIN are not connected.	Add connections	Table A.1 Wiring Diagrams
	Trip unit settings are not correct	Change settings	I.B. 29C892, Section 3 or I.B. 29C893, Section 4
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1	Para. 5-3
Breaker trips too rapidly on long delay.	Powered thermal memory may cause breaker to trip too soon.	If powered thermal memory is not required, turn it off using OPTIMizer.	I.B. 29C892, Para 3-6
	Trip unit settings are not correct	Change settings	I.B. 29C892, Section 3 or I.B. 29C893, Section 4

Table 5.1 Troubleshooting Guide (continued from previous page)

Symptom	Probable Cause	Possible Solution(s)	References
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3
Zone selective interlocking on ground fault and/or short delay does not work.	<i>See directions for checking zone selective interlocking</i>		Appendix B
Communication over IMPACC is not working. (Direct with BIM not involved)	No auxiliary power	Check that the Unit Status LED is blinking. If not, see first symptom in this table.	Symptom: "Unit Status LED is not blinking."
	Open INCOM connection	Check INCOM connections on side terminal block. The transmit LED should flash when there is communication. With INCOM connector unplugged, the resistance "looking into" the INCOM terminals should be approximately 2.5 ohms.	Table A.1 Wiring Diagrams
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3
<b>L and N-Frame Circuit Breakers without Auxiliary Power</b>			
Unit Status LED is not blinking at approximately a one second on-off duty cycle	Current thru breaker is < 20% of frame rating.	No problem. Status LED will not operate with breaker currents < 20% of frame rating.	N.A.
	Trip unit may be the problem	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3
As soon as current starts to flow thru the breaker, it trips and the instantaneous trip LED comes on.	Rating plug is not installed or is loose.	Install rating plug and/or check for loose connections.	Para 2-6 & 5-4.2
	Rating plug is open internally	Replace rating plug	Para. 5-4.2, Table 2.1
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3
LED does not come on when battery check button is pressed.	Battery installed backwards	Install correctly	Para. 5-4.1
	Dead battery	Replace battery	Para. 5-4.1, Table 2.2
	Trip unit may be the problem	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3
Power values are grossly in error (1050 trip units only).	Connections from PT Module to breaker not made or are incorrect.	Check connections	Table A.1 Wiring Diagrams
	Frequency incorrect	Verify operating frequency with OPTIMizer	I.B. 29C892, Para 3-6
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3

Table 5.1 Troubleshooting Guide (continued from previous page)

Symptom	Probable Cause	Possible Solution(s)	References
"Connection Failure" when OPTIMizer is plugged in.	OPTIMizer not working or cord not properly plugged into OPTIMizer.	Verify OPTIMizer operation on another breaker.	I.B. 29C892 Para. 2-2.2 & 3-2
	Cord not properly plugged into breaker.	Check connection. If unit status LED is blinking, connection is OK.	Para. 2-4.1
	Rating plug is not installed or is loose.	Instantaneous LED will be on. Install rating plug and/or check for loose connections.	Para. 2-6 & 5-4.2
	Rating plug is open internally	Replace rating plug	Para. 5-4.2, Table 2.1
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3
Ground fault alarm unit does not operate on a ground fault.	Connections to ground fault alarm unit are incorrect.	Check connections	Table A.1 Wiring Diagrams
	Ground fault alarm is not operating	Press test button on ground fault alarm unit. Button should illuminate. If it does not, check that 120V is being supplied to unit. If it is, replace the ground fault alarm unit.	Table A.1 Instructions for ground fault alarm
	Breaker is not providing an alarm	Temporarily disconnect the wires to L1 and L2 on the ground fault alarm unit. With these connections open, approximately 5 volts should appear between GF, AL and COM when the ground fault current exceeds pickup. On ground fault alarm breakers, this voltage will be present as long as pickup is exceeded. On ground fault trip breakers, this voltage appears only transiently after a trip and must be observed with an oscilloscope. If the voltage is not present, the problem may be in the breaker. Refer to Note 1 at the end of Table 5.1.	Table A.1 Instructions for ground fault alarm and wiring diagrams
Breaker trips on ground fault.	There actually is a ground fault	Check circuit to find the location of the fault.	N.A.
	On four wire systems the neutral current sensor may not have the correct ratio or be properly connected.	(1) Check neutral sensor and neutral sensor connections on side terminal block are good. (2) Check that the neutral current sensor ratio matches the breaker. (3) Check that connections from the neutral current sensor to the breaker are not reversed.	Table A.1 Wiring Diagrams
	Trip unit may be the problem.	Replace breaker. Refer to Note 1 at end of Table 5.1.	Para. 5-3