

CHECKING AND LOCATING LOW VOLTAGE GROUNDS (74 VOLT CONTROL CIRCUIT)

I. Checking for grounds.

The 27 point MU jumper cables must be disconnected from other units. All Circuit breakers, the battery knife switch, control stand and control panel switches should be closed.

Shut the engine down, block the NVR relay armature in the picked up position and set up all locomotive controls for power.

Connect a 75 volt, 6 watt test lamp from ground (locomotive carbody) to the battery knife switch positive post (left post). If the lamp lights, there is an indicated negative ground.

Move the test lamp from the positive post to the negative post of the battery knife switch. If the lamp lights, there is an indicated positive ground.

If there are any indicated grounds, the next step is to qualify the battery as being clear of grounds.

To do this, open the battery knife switch and use the test lamp to check from ground to the top positive and negative post of the knife switch.

If the lamp lights, the battery should be cleared of grounds by cleaning the cell tops with an ammonia and water or baking soda and water solution.

With the battery clear of grounds, close the knife switch and again connect the test lamp--first to the positive post and then the negative post of the knife switch.

II. Locating grounds.

If the lamp lights indicating a ground, proceed as follows.

With an indicated negative ground, leave the test lamp connected to positive and open the 2 and 3 pole circuit breakers (control, local control and lighting) one at a time. If the lamp goes out when a certain breaker is open, this indicates that this circuit is grounded.

If the lamp did not go out, this would indicate a BN circuit ground.

Following is an example of how to locate an indicated negative ground on the circuit fed by the control breaker (n circuit).

De-energize the control circuits by opening the battery knife switch and leave the control breaker open.

Use an ohmmeter on the X (x) 10 scale and go to the first terminal board (per wiring diagram), on the load side of the control breaker.

Disconnect all wires from the terminal board and read each one individually to ground. Note the wire with the lowest ohmic reading and reconnect all wires.

With the wiring diagram or wiring running list, determine the other termination of this wire with the lowest reading. At this opposite termination, disconnect all the wires and read each individually and note the lowest reading and reconnect all wires.

Continue tracing these wires with the lowest reading until the ground is located.

Note: When a wire terminates at a device like a relay or resistor, the terminal on the device should also be read when all the wires are disconnected.

When the lowest reading is on the terminal of the device then follow this path in tracing this ground as the ground may be in the device or a positive circuit and feeding through the device. A grounded positive circuit may be disconnected from the positive power supply by open relay contacts and, therefore, show up as a negative ground.

Also when tracing grounds, ignore all low readings and trace only the lowest reading and clear this ground. If other grounds still exist, then trace again following the lowest reading.

To trace an indicated positive ground, close the battery knife switch and all circuit breakers and set up controls for power.

Connect the test lamp to the knife switch negative, and start opening breakers one at a time. When the light goes out with a certain breaker open, this indicates a positive ground in that circuit.

As in tracing negative grounds, open the battery knife switch to de-energize all circuits and start tracing with an ohmmeter. With the particular breaker open go to the first terminal board on the load side of the breaker and disconnect all wires reading each for the lowest ohmic reading.

Continue following this lowest ohmic reading through the circuits until the ground or grounded device is found. AGAIN, MAKE SURE THAT AFTER ALL THE WIRES ON A TERMINAL HAVE BEEN DISCONNECTED AND READ WITH THE OHMMETER, THAT THEY ARE RECONNECTED BEFORE GOING TO THE NEXT TERMINAL.

An even more thorough check for grounds in control circuits can be made by having the test lamp connected to the knife switch negative with all the controls set up for power and then running a forward and backward transition sequence and then going into dynamic brake.

If unit is equipped with extended range braking, make sure unit cannot roll and then release the independent brake and move throttle lever to full brake position which will cause the brake program switch to step.

If the test lamp comes on during any step of transition or brake, use the wiring diagram to determine what circuit is used during that step only. Then de-energize the circuits and start tracing with an ohmmeter in that particular circuit.