

# Support Center Bulletin

Revision: 1

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Subject: Subject: Echelon Troubleshooting Guide

## Additional Sources:

**Reference Section 8 of the E2 Manual.**

**Reference Technical Bulletin 026-4500.**

**Reference Router/Repeater Installation and Operation Manual 026-1605.**

The most important thing to check when you encounter trouble with an Echelon Network is the cable type used in the installation. The only approved cable is that which is supplied by CPC (p/n 135-2300 non-plenum, 135-2301 plenum). Although there are many Level 4 cables out there that “meet the spec” of what we supply, their performance will fall short when installed. This cable is manufactured by ConnectAir.

Although the Echelon Network is not polarity sensitive, it is ALWAYS good practice to keep your connections consistent throughout the network. Keep the blue conductor on the left or bottom terminal (depending on the device’s orientation), and the white conductor on the right or top connector. This will make troubleshooting and tracing wires much less confusing. Although the Echelon connections in the TD3 are both blue in color, the use of the whip (p/n 335-2215) and Molex connection will keep the orientation of the connections consistent due to the color coding of the whip.

## Box-to-Box Communications Issues – Controllers Don’t “See” Each Other

- Check to see if the Peer-to-peer network is configured incorrectly in General Information. (This is defaulted to Ethernet.) Press ALT-T, F2 to view Peer Network setting.
- You may not have an Echelon card. There has been a change in part numbers that has caused some controllers to be mistakenly ordered with out a card. Contact your Sales Representative if you have this issue.
- Termination jumpers are not set correctly. (Up is terminated, down is not terminated. There should be around 53-80 ohms on a properly terminated network. If it is not terminated, it could cause the ohm reading to be less than 50 or greater than 100. Ohm readings will vary slightly depending on the cable footage.) Reference Section 8 of the E2 manual for more information.
- Mismatch of Firmware Revisions and/or duplicate subnet addresses can wreak havoc on the Echelon network and should be checked. Press ALT-V to confirm the firmware version of each controller.
- Incorrect type of wire or bad wiring connections between the controllers. (This can sometimes be spotted by performing an ohms check on the cable.)

The larger networks, such as TD3s, present different problems. Since there are usually more than one run or ‘segment’, a repeater card may be used at the controller to provide multiple channels to which the segments can be wired. Each segment has to be

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terminated using a Termination Block (p/n 535-2715). The repeater also provides a means of isolating the different segments when troubleshooting for problems. By isolating one segment at a time from the repeater, you can test individual cable runs and narrow-down the area with a problem.

### **TD3 Communications Issues – Intermittent ‘Device Absent’ Alarms**

- The Molex connector that connects the whip to the TD3 has on occasion, been found to cause network issues. The connector on the whip has a total of four wires, two in and two out. If one of these wires pulls out when the cable is installed at the factory, the network may or may not continue to function, or function intermittently. This plug should be accessible by un-mounting the TD3 from the case and pulling the harness out through the TD3 hole. If there is not enough slack to pull out chances are the cable was pulled too tight when installed and the connection is damaged.
- Moisture can ‘wick’ its way into the TD3, via the ground wire or sensors, causing corrosion to form inside the device. This has been observed in a few service deli cases that are washed on a regular basis and the employee managed to saturate the electronic device (TD3). The TD3 will require replacement if moisture is seen inside the TD3 enclosure when looking at the back of the device.
- Faulty or poor wiring, especially at the case connections. Since there are many connections, the chances of a bad one increases. The symptoms of this problem would be similar to the Molex connector issue. There would be ‘device absent’ alarms in the controller, but quickly show back online. **It is possible to have an open wire on one of the two wire connections and devices still communicate to the controller** due to the fact that the Echelon Network is not polarity sensitive. Messages can travel on either wire in either direction at any time.
- A bad TD3 will usually present itself as offline or display erroneous values.
- If a TD3 has its 24vac power shorted to ground and the ground wire is connected, the TD3 display will flash on and off. It will also display bogus values on the read out. (This has been seen in cases where the power wire was pinched by a bolt or screw. This may not show itself right away, as case fan vibration may cause this to happen well after installation.)
- Use of the A & B hand held analyzers (p/n 811-5000) helps to narrow down and isolate wiring issues and noise, especially before the network is up and running. This is helpful on start-ups and pre-start-ups. Basically, the A & B units “talk” to each other by simulating TD3 communications across a given section of wire. If their packets of information are distorted, the analyzers display either an open wire, shorted wire, or noise on the cable.
- Grounding of the network shield is extremely important, and even more important, is what it is grounded to. It cannot be grounded to the equipment ground that is also being used to ground the lights, fans, defrost/anti-sweat heaters, etc. It must be grounded to the chassis of the case or cooler
- Duplicate neuron ID numbers on the network. Verify that there is not duplicate numbers in the network set up screen. This could have easily happened during a

start-up or device replacement if the wrong service pin were pushed during commissioning. Press MENU, 7, 7, 3 to view the Controller Setup Screen.

- A bad channel on a repeater can and has caused problems. Sometimes there is a spare channel available for use. If another channel is used, make sure the termination jumpers are set the same, given they were correct to begin with.

### **ESR Communications Issues**

- When a rack has ESR boards and valves installed, it must be remembered that they are all ‘daisy-chained’ together on the network. Smaller than the TD3 network, but larger than the Box-to-Box, the ESR network is usually not a problem as long as the wiring is correct. A repeater is not necessary, as it is one continuous network. Although some installations have remote headers that have remote ESR boards and may have a long run of Echelon cable, it is not a problem as long as the termination jumpers are set correctly in the controller(s) and the cable runs are properly terminated.
- ESR boards do not ship with termination jumpers. If there is an ESR board at the end of the network, you should add a Termination Block added at the end of the Echelon Cable, just past the last device.
- It is strongly recommended that the wiring to/from the ESR board be doubled up in one Echelon plug, rather than using separate plugs for in/out. This keeps the network intact in the event it becomes unplugged from the board during testing or by mistake.

### **CC-100**

- The Echelon network for case controllers is similar to the TD3, but much more information, or ‘packets’, are traveling on the network and there is more concern for collision. This is why routers are used to help filter out the traffic between subnets, (or controllers).
- Termination is extremely important when dealing with this type of network. Check to make sure a termination block is used at the end of each segment. This also includes the segment ending at the router. The ohm readings would be the same as previously stated, again depending on cable footage.
- The hand-held analyzers can also be used to troubleshoot a noisy network or to pinpoint a problem area in the wiring.
- During start up, it is recommended that the E2 controllers are not wired together until the CC-100s are talking on their own subnet. This reduces the time required to troubleshoot a problem if one exists.
- Like the TD3 network, if there is a problem on the network, the ‘divide and conquer’ approach is the fastest way to resolve open, short or noise issues.
- Grounding is very important as well, although the CC-100 is a larger device than the TD3 and when fastened to a case provides ideal grounding of itself. The level IV cable shields still need to be grounded, and not to the equipment ground as stated in the TD3 section.
- When replacing a CC-100, it is necessary to completely delete the old device from the network and then add a new device back, rather than re-assign a new CC-100 to the network.

## Echelon Troubleshooting Quick Reference

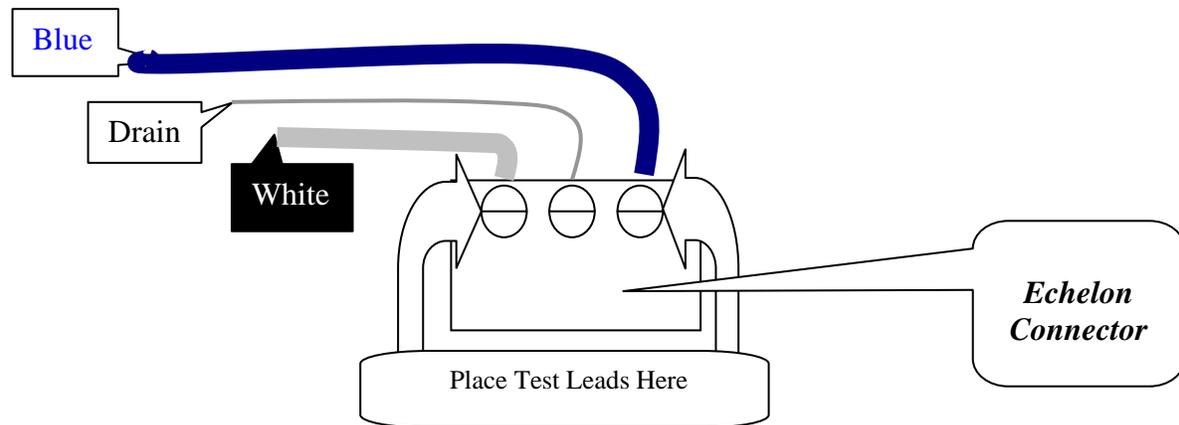
USE APPROVED LEVEL IV CPC CABLE ONLY (reference Tech Bulletin 026-4500)  
DAISY CHAIN CONFIGURATION ONLY. No Star Configurations allowed.  
4592 feet maximum length.

### Common Practices:

Termination: Use the on board termination jumpers on E2 Controllers. On ESR-8 boards, Case Controls, and TD3s - use termination blocks ONLY. CPC P/N 535-2715

### Testing:

Step One: Termination Ohm Reading – read at E2 or Router/Repeater Echelon connection. White to Blue wire (not to ground) with connector plugged into controller.



0 termination = 3 Meg Ohm or higher, up to infinity. No segment should be un-terminated.

1 termination (only one end terminated) = 105 (+ 33 Ohms per 1000 feet)

2 termination (both ends terminated) = 52 (+ Resistance from the wire)

3 termination (triple terminated) = less than 52 Ohms. No Segment should be triple terminated.

To measure the length of wire on a terminated echelon network, you must go to one end and remove the termination. The Einstein or E2 is often one end of the network and it is simple to test from this point. If the controller is the termination point, remove the plug from the controller. Read the resistance on the wire. If the controller is not the end of the network, you must find a termination block on the network and unplug it. Then read the resistance on the wire. Do not forget to reconnect the termination once you have taken the readings.

The formula to calculate the wire length is as follows:

$(\text{Resistance of the network with only one termination point connected} - 105) / 33 \times 1000$

Example: Properly terminated network reads 73 Ohms. With one termination disconnected, the network reads 180 Ohms.

$(180 - 105) / 33 \times 1000$   
 $(75 / 33) \times 1000$   
 $2.2727 \times 1000$   
2,272.7 feet

Each segment can be identified by its ohm reading because the readings will be the same reading from either end of the segment.

Step Two:      Ohms from White to Earth Ground – infinity (OL)  
                    Ohms from Blue to Earth Ground – infinity (OL)

Any continuity read between the shield and the insulated conductors must be investigated and corrected.

**END**