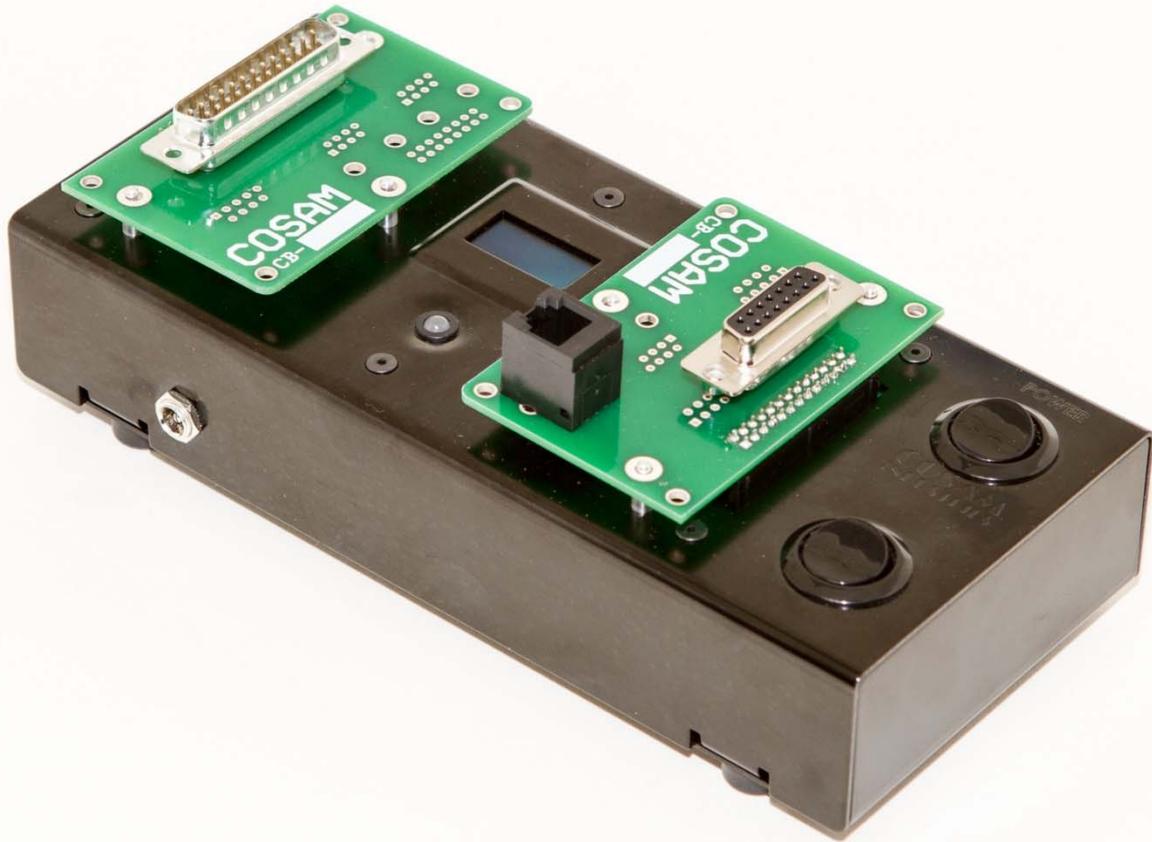


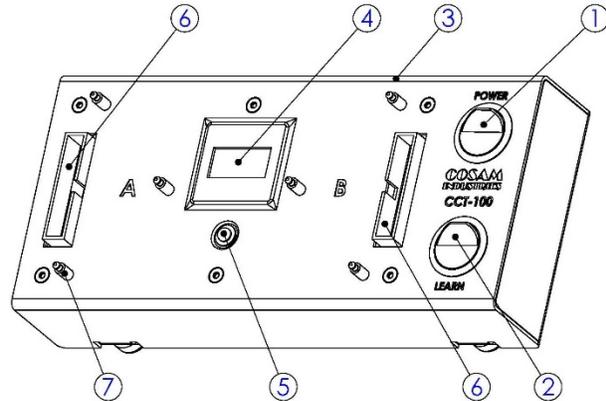
CCT-100 User's Guide



The CCT-100 is a very simple and intuitive cable verification device. It can be used by anyone with very little training. The system works by memorizing the connections of a known good cable and then comparing those connections to a single or group of test cables.

Identification:

1. Power Button
2. Learn Button
3. Power Connection (5V DC)
4. Display
5. Indicator light
6. Connector board ports
7. Connector board supports (6x)



Features:

- **Capable:** 52 Testpoints (Cables up to 26 wires) Detects Opens, Shorts, Miss-wires, Bad connections and Diode polarity.
- **Versatile:** Many standard connector boards available as well as a build-your-own option for specialized connectors.
- **Compact:** 7.75" x 3.5" x 2.0" (197mm x 89mm x 51mm)
- **Rugged:** Made from 18 gauge cold rolled steel
- **Fast:** Tests at speeds up to thirty times per second.
- **Intuitive:** Easy to read status updates shown on the clear and bright OLED display along with Simple Pass/Fail indication by both green/red LED and dual tone audio buzzer.

CCT-100 & CCT-100B

- The "B" at the end of the model number indicates the model is equipped with a rechargeable Lion battery. Battery models may be identified by the I/O symbols on the power switch. Non-battery models do not have the I/O symbols on the power switch.
- The battery option allows for up to thirty hours of testing on a single charge.

Quick Start

- 1) **CHARGE:** For all CCT-100B models, Use the supplied cable to charge the battery. A full charge will take less than three hours and provide three full days of testing. For CCT-100 models, plug in the adapter cable to a standard outlet.
- 2) **PREPARE:** Install Connector Boards and/or interface cables and make sure no test cables are connected to the unit (During Power-up)
- 3) **POWER-UP:** Turn on the CCT-100. After passing a self-diagnostic check, the display will show “READY” if there is a cable stored in memory or “EMPTY” if there is not. The indicator light will be blue ●.

WARNING: Make sure the cables you are testing are not attached to any type of power supply. Cables connected to a power supply or power storing device may cause personal injury through electric shock and will damage the CCT-100 and void the warrantee.

- 4) **LEARN:** Attach a known good cable¹ to the connectors on the connector boards.
 - a. A green ● indicator light means the current cable matches the last cable stored in memory. The display will show a unique cable code.
 - b. A red ● indicator light means the CCT-100 has detected a cable is connected, but it does not match the last cable stored in memory. To store the currently connected cable in memory, press and release the “Learn” button. The indicator light should then turn green ● and a unique cable code will appear in the display.
 - c. *NOTE: When the “Learn” button is pressed, the tester retains the cable information even when powered down.*
 - d. *{Optional} If this type of cable will be tested again at a future date, then the unique code should be recorded. There is a sample “Cable Code Log” sheet at the end of this user guide.
At a future date, a known good cable will not be necessary. Simply connect the first test cable and compare the unique code with the one that you have recorded. If they match, then the cable on the tester is verified. Press the “Learn” button to store the code into the tester and you’re ready to test the rest of your cables.*

- 5) **TEST:** Remove the known good cable and connect a test cable. Bend/twist the cable close to all connectors in all directions and listen for the tone to change and the indicator light to flicker from green to red. If this occurs, then the cable is wired correctly, but is unacceptable because a short is likely to occur in application.
- a. A green ● light indicates the test cable is wired the same as the cable stored in memory. (A good cable)
 - b. A red ● light indicates the test cable is not wired the same as the cable stored in memory. (A bad cable)
 - c. A blue ● light indicates the CCT-100 is not detecting a connection between any of its 52 test points. (No cable)
- 6) **REPEAT:** Repeat step 5 for all other test cables.

1 How to establish a “known good cable”

– There are several ways to establish a known good cable. The easiest way is to use a cable that is working in the application. If that is not practical, then the cable can be tested manually with a multi-meter or some other continuity measuring device. The good part is that you will only have to do this once for each cable type if you recorded the unique code in a log book. In the future you can verify correct wiring by matching the unique code to the one in your log book.

Connector boards vs. Interface cables

Connector boards provide the fastest and most trouble free testing. They are faster than interface cables because they only require one hand to install or eject a test cable. They are more reliable and they last longer because there are no wires to bend or twist. **Interface cables**, on the other hand are less expensive and can be used with almost any type of cable connector. If you can't find a connector board for your application, then there are a couple of options.

- a) You can purchase a Build-Your-Own connector board along with the mating connector to your cable. The Build-Your-Own option allows the use of any connector to be installed on a connector board. It will require you to drill and mount as well as wire the connector to the board.
- b) You can purchase an [interface cable](#) along with the mating connector to your cable. The interface cable option is the easiest and least expensive option to assemble, but is not as durable and will increase testing time compared to the Build-Your-Own option.

How to make your own Interface cables:

Making your own interface cables is a fast and simple process. You will need to purchase the mating connectors for the cables you will be testing along with an interface ribbon cable to connect to the CCT-100.

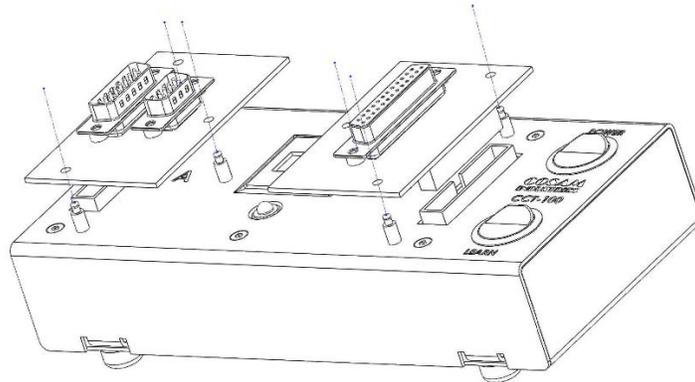
The process is to attach each pin on the connector to a single wire on the interface cable. It doesn't matter which wire on the interface cable is used as long as you only use one. Multiple connectors can be wired to the same interface cable. For example, an 8 pin male Molex connector, an 8 pin female Molex connector, and 9 pin D-sub connector could all be installed on a single interface cable. This makes interface cables very economical. Any un-used wires on the interface cable can simply be cut off. Just make sure that the cut ends cannot touch each other.

High density connectors:

Modern cables have many connections in a small area. For example a USB-C cable can have as many as twenty-four independent connections. The issue with having so many connections in a close proximity is that when the cable is moved, bent or twisted, the internal wires of the cable move in relation to each other. This movement can cause the connections inside the connector to touch each other (or short). As the cable is flexed it may have an intermittent short between two or more connections, but may appear good in a static position. Therefore when testing a cable, connected it as normal and then bend the wire in all directions to make sure there isn't any intermittent shorts. If the CCT100 detects an intermittent short, then the indicator light will flash red and the tone will change to a different pitch.

Detailed Operation Instructions:

- 1) Install connector boards or interface cables (as required)
 - a. Align the boards directly over the connectors and push straight down allowing the three alignment posts to pass thru the board. The alignment posts have ball shaped tops that allow the connector boards to be held in place without any additional hardware.



- b. Make sure no cables are connected to the unit during Power-up. This allows the unit to run a diagnostic check and fully calibrate itself.
- 2) **POWER:** Press the power button.
 - a. The Display will briefly flash *Cosam* followed by a software revision number as the unit runs a self-diagnostic test.
 - b. If the self-diagnostic test passes, the display will show either "READY" or "EMPTY". READY means there is a cable stored in memory. EMPTY means there is not a cable stored in memory.

The indicator light will be blue ● meaning the CCT-100 is not detecting continuity between any of its 52 test points.

- c. If the self-diagnostic test fails (The above does not happen), then there is an internal problem and the CCT-100 must be returned for service.

WARNING: Make sure all cables are not attached to any type of power supply. Cables connected to a power supply may cause personal injury and will damage the CCT-100 and void the warrantee.

- 3) **LEARN:** Attach a known good cable
- The indicator light may be red ● or green ● and there will be a repeating audible beep. The beep tone coincides with the indicator light color allowing both audio and visual cable verification.
 - If the indicator light is red ●, then the CCT-100 is detecting a cable is connected, but does not match the last cable stored in memory. If you're sure the cable is wired correctly and want to store its connections into the CCT-100, then press and release the "Learn" Button. (This copies the cables connections into memory) The Indicator light will then change to green ● and the audible tone will change as well.
 - If the indicator light is green ●, when the known good cable is connected, then the CCT-100 is detecting a cable is connected and it matches the last cable stored in memory. (In this case, the known good cable was the same as the last time the learn button was pressed.)

NOTE: The CCT-100 keeps the last cable stored in its memory even when powered down.

At this point, you may wish to write down the Unique Cable Code shown on the display for later reference. {At the end of this guide is a template that can be used to record cable codes.} In the future when this type of cable it tested a known good cable will not be required. The cable can be verified by comparing the display of the current cable with the cable code written in the log. If the cable codes match, then you have a known good cable and can store the value into memory by pressing the learn button.

- 4) **TEST:** Disconnect the known good cable and connect a test cable
- If the test cable is wired the same as the known good cable, then the indicator light will be green ● and the Cable Code shown in the display will match that of the known good cable.
 - If the test cable is not wired the same as the known good cable, then the indicator light will be red ● and the Cable Code shown in the display will not match that of the known good cable.

Bend the cable close to all connectors in all directions and listen for the tone to change and the indicator light to flicker from green to red. If this occurs, then the cable is wired correctly, but is unacceptable because a short is likely to occur in application.

- 5) Continue testing all other test cables.

Theory

Cosam CCT-100 series testers work by reading continuity. Each of the 52 test points are sequentially powered with a 5 volt test signal and the remaining 51 test points are scanned for a voltage reading. All points that have a reading are stored in memory. Then, the next pin is powered and all other points are scanned and stored in a separate memory location. After all 52 points have been powered and scanned, a geometric progression is used to combine all connections into a unique value. The number of possible combinations that these 52 pins can be connected is 2^{51} or a sexdecillion. To reduce the number of digits required, the value is converted to hexadecimal code and then sent to the display. This process occurs approximately thirty times per second.

By using the method above, the CCT-100 looks for continuity in both directions. This is extremely valuable if the cable being tested has a diode or an LED embedded in it. Because diodes only allow current to flow in one direction, if they are installed backwards the entire circuit changes. For example, a cable to be tested has an LED installed between pin 7 and pin 43 with the anode connected to pin 7. When the CCT-100 evaluates the cable it will determine that there is continuity from pin 7 to pin 43, but will not see continuity in the reverse direction (pin 43 to pin 7). If the LED were installed backwards, the CCT-100 would detect it, fail the cable and display a different unique code.

Due to the fact that the CCT-100 works by measuring small voltages, it is very important that the cables being tested do not have any energy storing components in them. For example, if a cable for some reason had a capacitor inside of it, then the testing results would be erratic and if the capacitor was charged with a high voltage, then personal injury via electric shock as well as damage to the CCT-100 may occur.

Maintenance:

Tester Maintenance: The CCT tester requires no maintenance, but should be kept clean for best performance. If desired the outside surfaces may be cleaned with a mild cleaner. If debris accumulates on the connector board ports, a vacuum and soft brush (like a tooth brush) should be used to remove it.

Connector Board Maintenance: The contacts on all connector boards should be kept as clean as possible. After thousands of repeated insertion cycles the gold plating on the connectors will begin to wear off. As this occurs, higher connection resistances will also occur and at some point the connector board will need to be replaced



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REV: 4/16/2019

Specifications:

- Input Voltage: The Power supply shipped with the CCT-100 is a standard 120/240VAC Class 2 US style plug. Other plugs may be used as long as they meet the voltage and amperage requirements listed. The connector is a 5VDC, center pin positive  5.5 mm x 2.1 mm. The minimum current rating is 200mA. Do not use a power supply with more than 5VDC on the battery powered model or damage will occur.
- Test Voltage: 5 VDC
- Test Current: 15 mA Max
- Maximum detectable Resistance: 50kΩ (± 10%)
- Operating Temperature Range: -20°C to 43°C (-4°F to 110°F)
- Size: 7.75" x 3.5" x 1.5" (197mm x 89mm x 38mm)
- RoHS 3, ECHA Reach (SVHC-197) Compliant

Trouble Shooting:

Condition	Possible Resolution
When unit is switched on, Nothing happens	1) The Power supply is defective. Make sure there is 5 VDC from the power supply. Replace if necessary. 2) If model CCT100B, the battery needs to be charged 3) There is an internal problem with the CCT-100. Contact factory for repair or replacement
When unit is switched on, the indicator light is either red or green, but not Blue as it should be	1) The CCT-100 is detecting that a cable is connected to the unit. Remove all test cables and connector boards and try again. If the condition is resolved, carefully inspect the connector boards for shorts. 2) If the condition isn't resolved, make sure there is no debris on the CCT-100 connectors.
The unit is displaying a different unique code for a known good cable.	1) Swap the positions of the connector boards. If this doesn't work, then switch them back. 2) Make sure you are using the same connector boards, or transition cables as you were when the original unique code was recorded.
The Unit is displaying "LOW BATT" on the display	1) If model is CCT-100B, then the Battery needs to be charged. Turn the unit off and charge for at least two hours. 2) If model is CCT-100, then there is an internal issue. Contact the factory for repair or replacement

