CAN Test Box

User's Guide

NOTICE

1. **Caution:** As active LED signals may have the potential to interfere with CAN signals we do not recommend that you connect the CAN Test Box (CTB) to late model CAN protocol vehicles under the following conditions:

   i. With a scan tool attached while driving the vehicle during or under road test conditions.

   ii. CTB left connected to the vehicle OBDII connector while road testing or left connected to the vehicle for extended periods of time.

2. **Warning:** Only use external test devices such as probes, oscilloscopes or diagnostic equipment with more than 1 megaohm of input impedance.

3. **Warning:** Do not connect the CTB when performing any vehicle re-flash or reprogramming procedures with scan tool or pass-thru programming devices connected. Failure to observe this can cause control module failure or damage.

4. **Warning:** Do not use the CTB to power any external test devices in excess of 1.2 amps.

5. **Warning:** Use caution at all times when probing the 16-pin breakout connection panel. Bridging pins, e.g. pin 16 (POWER), to any other pin could result in serious vehicle electrical or computer damage.

6. **Warning:** The working and operating voltage of the CTB is 12 V to 32 V DC. Under no circumstances should the CTB be used on any vehicle which has a higher operating voltage or the CTB unit will be permanently damaged.

7. **Warning:** Care should be taken not to drop the CTB onto the OBD female end or to use excessive force when connecting a scan tool, as the CTB 16-pin female connector may be pushed in or broken. This is deemed to be operator abuse and is not a warrantable item.

   Failure to observe these warnings may result in vehicle, CTB or scan tool damage or incorrect test results.

Product Use Limitations, Warranty Disclaimer

Pico Technology supplies the CAN Test Box (CTB) product for a number of intended uses. Please refer to the product label for the intended use statements for specific product applications.

Pico Technology warrants upon delivery, and for a period of 12 months unless otherwise stated from the date of delivery, that the Goods will be free from defects in material and workmanship.

Pico Technology shall not be liable for a breach of the warranty if the defect has been caused by fair wear and tear, wilful damage, negligence, abnormal working conditions or failure to follow Pico Technology's spoken or written advice on the storage, installation, commissioning, use or maintenance of the Goods or (if no advice has been given) good trade practice; or if the Customer alters or repairs such Goods without the written consent of Pico Technology.
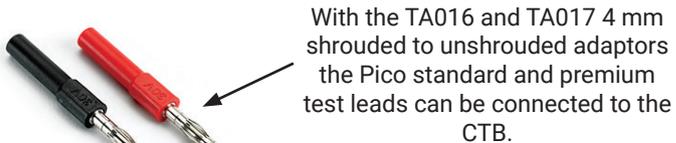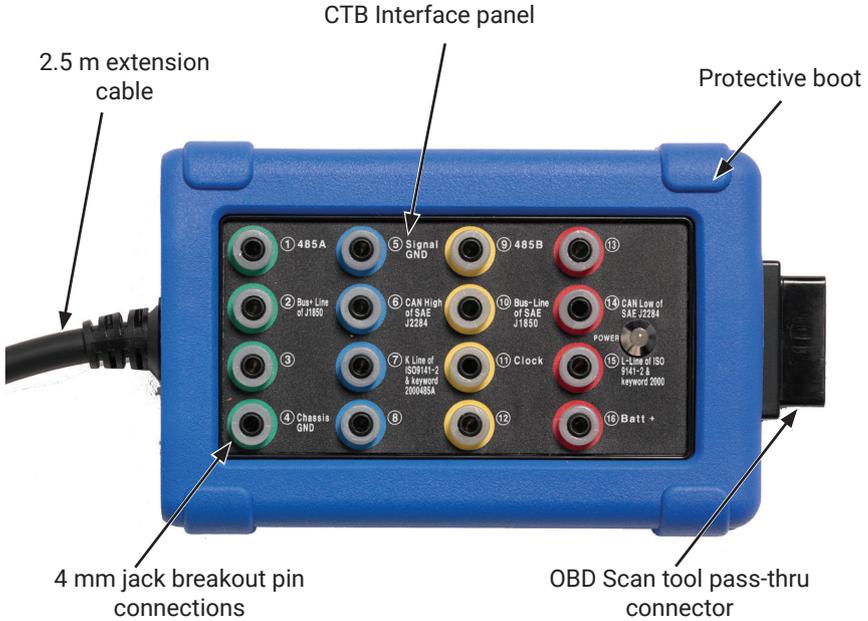
In no event shall Pico Technology be liable for claims for any other damages, whether direct, incidental, foreseeable, consequential, or special (including but not limited to loss of use, revenue or profit), whether based upon warranty, contract, tort (including negligence) or strict liability arising in connection with the sale or the failure of the CAN Test Box to perform in accordance with stated specifications.

DISCLAIMER

Please note that when using the CTB as a scan tool extension lead, you may experience protocol interference on some vehicles when connecting to the ECU.

Note: The CTB should not be attached when you are reading or clearing fault codes or during any programming, adaption or special functions when you use it in conjunction with a scan tool.

CTB components

CTB Interface panel

2.5 m extension
cable

Protective boot

4 mm jack breakout pin
connections

OBD Scan tool pass-thru
connector

With the TA016 and TA017 4 mm
shrouded to unshrouded adaptors
the Pico standard and premium
test leads can be connected to the
CTB.

CTB 2.5m Extension Cable and Fast Check OBD Connector

The CTB utilizes a 2.5 meter shielded extension cable with a Fast Check
ODB connector. This allows the user to connect the CTB to the vehicle's
OBD port for viewing and operation of the CTB away from enclosed areas.
The CTB incorporates diode fuse protection for Pin 5 (Signal Ground) plus
Polyswitch Fusing for Pins 4 & 16 (Chassis Ground and Battery+).

CTB interface panel

The interface panel utilizes numbered backlit LEDs which illuminate when signal data is present on the corresponding LED line. Pulsing LEDs indicate signals being pulled alternately high and low. The CTB LEDs correspond to the vehicle's OBD port, pins 1-16.

🟢 LEDs 1-4 GREEN, 🔵 LEDs 5-8 BLUE
🟡 LEDs 9-12 YELLOW, 🔴 LEDs 13-16 RED

CTB LED Description

When the CTB is interfaced with the vehicle OBD port and if there is signal data present, the corresponding CTB LED will be activated.

🟢 1: 485A *	🔵 5: Signal GND (SIGNAL)	🟡 9: 485B *	🔴 13: future upgrade
🟢 2: Bus+ Line J1850	🔵 6: CAN High of SAE J2284	🟡 10: Bus− Line J1850	🔴 14: CAN Low of SAE J2284
🟢 3: future upgrade	🔵 7: K Line of ISO9141-2 & keyword 2000	🟡 11: Clock	🔴 15: L Line of ISO9141-2 & keyword 2000
🟢 4: Chassis GND (GROUND)	🔵 8: future upgrade	🟡 12: future upgrade	🔴 16: Batt+ (Voltage Supply)

* Manufacturer's proprietary information

CTB LED Monitoring

Establish the CTB LED display by connecting the CTB cable to the vehicle OBD port. Data signals present on the vehicle's network will illuminate the corresponding LEDs on the CTB panel.

The illumination of CTB LEDs is important:

- CTB POWER (CTB is powered up)
- Batt+ (vehicle OBD port Pin 16)
- Chassis GND (vehicle OBD port Pin 4)
- Signal GND (vehicle OBD port Pin 5)
- Appropriate LEDs for the CAN data protocol in use for the vehicle being tested (use the pulsating LEDs to identify the CAN protocol)

Test vehicle example: Mazda CX7

This example demonstrates the 'wake up' mode of the CAN system. The ignition key turned to 'ON' mode. LEDs 6 (CAN High) and 14 (CAN Low) of the CTB flash and show the CAN system is now operational. Other LEDs may also flash indicating proprietary layered data line activation. On this example vehicle CTB LED 3 also illuminated.

Illuminated CTB LEDs:

- POWER
- 4 (green) - Chassis GND
- 5 (blue) - Signal GND
- 16 (red) - BATT+ (indicating power and ground circuits are operational)

- 16 (red) - BATT+ (indicating power and ground circuits are operational)
- 6 (CAN High)
- 14 (CAN Low) - system uses SAE J2284 protocol and is in 'wake up' mode

CTB Scan Tool Pass-Thru Connector

The CTB is equipped with a 16 pin Pass-Thru which allows you to connect a scanner (generic or OEM) for the purpose of systems scan data monitoring or systems activation.

- Connect the CTB 16-pin cable to the vehicle OBD port.
- Connect the scan tool 16-pin cable to the CTB pass-thru connector.
- Simultaneously monitor CTB LEDs and scan tool Data.
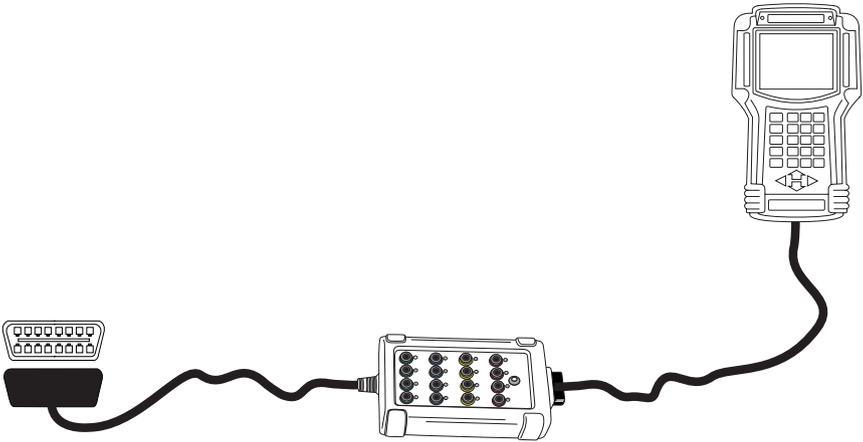
CTB Oscilloscope connection

Connect the PicoScope to your PC/Laptop via USB. Set up the PicoScope 6 Automotive software as necessary to enable signal data capture.
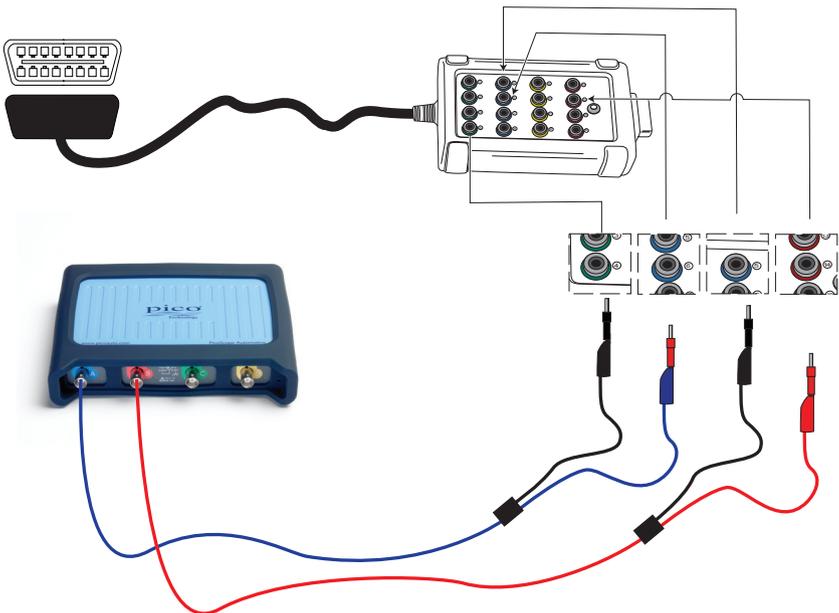
The CTB pins are accessible via standard 4 mm jacks (adaptors included).
With the CTB you can connect to any automotive PicoScope, enabling the capture of bus signal data waveforms.

The CTB is supplied with four 4 mm adaptors, which can be used in conjunction with Pico's standard or premium test leads, utilizing PicoScope's BNC connectors.
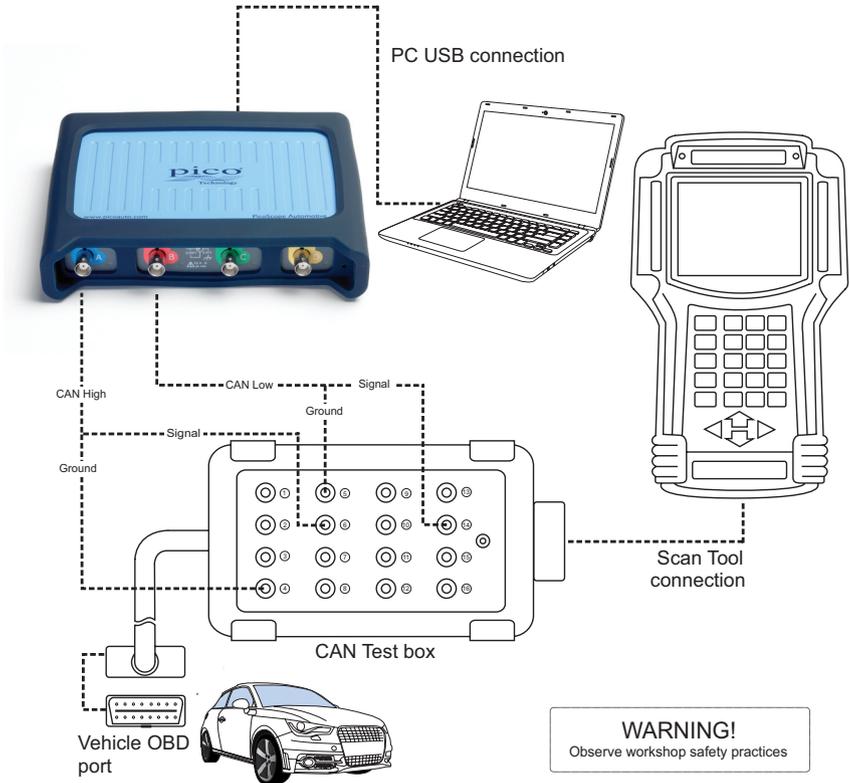
- Connect the CTB 16-pin cable to the vehicle OBD port.
- Connect one standard or premium test lead to the PicoScope.
- Connect a supplied 4 mm adaptor to the opposite end of the test lead.
- Connect the unshrouded 4 mm jack to the corresponding CTB pin.
- Connect the test lead ground (black lead) to CTB LED pin 4 (Chassis GND) or 5 (Signal GND).

An example use would be to use two channels to observe CAN High and CAN Low signal data.
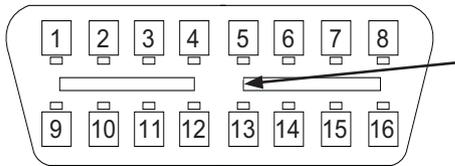
CTB, Scan Tool and Oscilloscope Connections

CAN Test box connection schematic

PC USB connection

CAN High

CAN Low   Signal

Ground

Signal

Ground

Scan Tool
connection

CAN Test box

Vehicle OBD
port

WARNING!
Observe workshop safety practices

OBD-II Connector Pin Designation

This notch in the cable connector on your CTB identifies the unit as 24V compliant.

OBD II Connector

Note: ISO9141-2 & ISO 14230 (keyword 2000) use the same pinout, so you cannot distinguish between the two by simply examining the connector. Connect and use the CTB. Monitor the LED indicators for protocols activity to identify the network structure in use.

Pin	Designation
1	- Manufacturer's Proprietary
2	- Bus+ Line of J1850
3	- Manufacturer's Proprietary
4	- Chassis Ground
5	- Signal Ground
6	- CAN High of SAE of J2284
7	- K Line of ISO9141-2 & keyword 2000
8	- Manufacturer's Proprietary
9	- Manufacturer's Proprietary
10	- Bus- Line of SAE J1850
11	- Clock - Proprietary
12	- Manufacturer's Proprietary
13	- Manufacturer's Proprietary
14	- CAN Low of SAE J2284
15	- L Line of ISO 9141-2 & keyword 2000
16	- Battery Power (4 amp max.)

CTB and CAN-Bus system diagnostics

Please note: Some vehicles may require the connection of a scan tool prior to connecting the CAN Test Box. This is necessary as a scan tool may be needed to log on as a communication node of the CAN-Bus system. Without scan tool recognition, the system will not transmit signal data to the CTB and therefore connection of the CTB may result in failure of the CTB interface LEDs to operate when performing a diagnosis.

United Kingdom HQ:	USA regional office:	German regional office:
Pico Technology	Pico Technology	Pico Technology GmbH
James House	320 N Glenwood Blvd	Im Rehwinkel 6
Colmworth Business Park	Tyler	30827 Garbsen
St. Neots	Texas 75702	
PE19 8YP		
United Kingdom	United States	Germany
☎ +44 (0) 1480 396395	☎ +1 800 591 2796	☎ +49 (0) 5131 907 6290
🖷 +44 (0) 1480 396296	🖷 +1 620 272 0981	🖷 +49 (0) 5131 907 6297
✉ sales@picoauto.com		✉ info.de@picotech.com
www.picoauto.com		

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