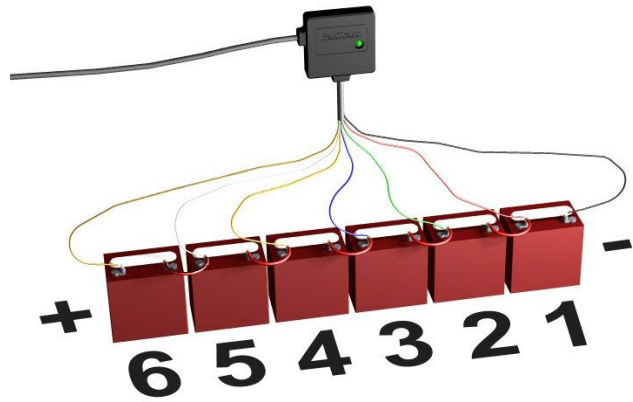


PakTrakr Installation and Troubleshooting Tips

Installation Cautions

1. Get each Remote working independently BEFORE connecting to other Remotes or to the Display.
2. The Remote's blue connectors should ONLY be connected to the expansion port on other Remotes or to the Display. Do NOT remove the connectors and splice the wires from multiple Remotes together.
3. The black leads from the Remotes should be connected to the negative post of the MOST NEGATIVE battery in the sub-string that Remote is monitoring. The red lead should be connected to the positive post on the same battery the black lead is connected to.
4. Keep Remote ring terminals from inadvertently contacting battery terminals or the vehicle chassis during installation.
5. A Remote should only be connected to an unbroken series string of 1-8 batteries. I.E. a Remote should monitor batteries 1-6 or 7-12, etc. NOT batteries 1-5 and battery 10. NOT batteries 1-5 and battery 10.
6. 8-battery Remotes may NOT be connected to 12V batteries, as doing so may destroy the Remote. 8-battery Remotes should only be used on 3.2V, 6V, or 8V batteries. 6-battery Remotes may be connected to any batteries up to 12V.



System Installation Tips

1. Make a "dry run" test of the entire PakTrakr system when possible before routing, cutting, or splicing any cables. The best place to conduct this test is right next to or inside the battery bay. Connect the Remotes (see tips below), then connect the Display and check for proper system operation before the Display and Remotes are mounted in their permanent locations.
2. Each Remote should be installed and operating correctly before individual Remotes are connected together or to the Display (see Installing Multiple Remotes section below).
3. To ensure proper calibration, the Pack should be charged before installing the PakTrakr system.

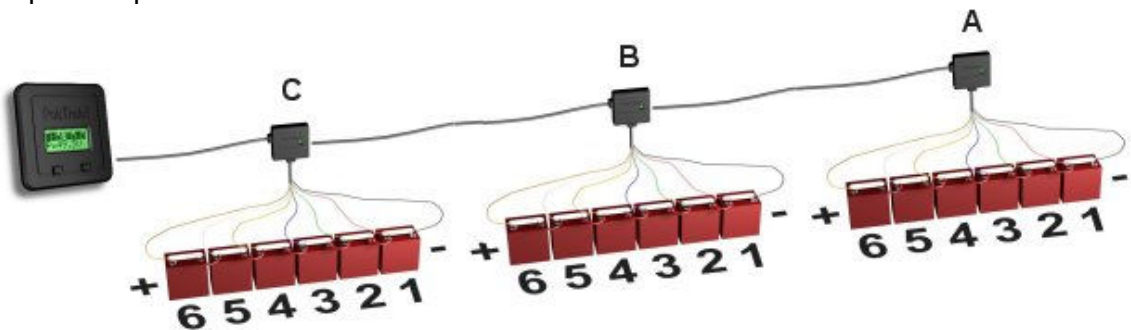
Installing PakTrakr Remotes

1. Start with the Remote's black and red leads. Make SURE the black lead is on the negative post, and the red lead is on the positive post of the SAME battery, the MOST NEGATIVE battery in the sub-string the Remote is to monitor. Connect these leads FIRST, then STOP. The Remote's LED should be on solid, and then start blinking within ten seconds. (Note: for NiCd Remotes, the LED

- won't blink until the black, red, and green lines are connected, and for Lithium Remotes, the blue line must be connected as well.)
2. If the Remote is not blinking within ten seconds, something is not right - disconnect the black lead to reset it, and try again, double-checking for correct battery polarity.
 3. When the Remote LED is blinking, connect all remaining battery leads for the Remote and make sure the LED continues to flash (about once per second).
 4. The Display may be used to fully verify correct operation of each Remote prior to connecting them together:
 - a. Plug the Remote's blue connector into the back of the Display.
 - b. After a brief power-up (and the Display showing "Calib...") use the left button to verify that the Display shows all batteries connected to that Remote.
 - c. If you have multiple Remotes to install, repeat steps 1-4 for each Remote.

Installing Multiple Remotes

1. Verify that each Remote works independently and has a blinking LED before connecting any Remotes together.
2. Start the daisy-chain connection with the Remote to be connected to the Display - connect its blue connector to the back of the Display.
3. Verify that the Display shows all the batteries connected to the first Remote.
4. Plug the next Remote's blue connector into the expansion port on the side of the first Remote.
5. Verify that the LEDs on the connected Remotes begin blinking in sync.
6. Verify that the Display now shows all batteries from multiple remotes (e.g. "A" and "B"). If not, check that all pins on the second Remote's blue connector are firmly seated in the connector, and that the connector is firmly seated in the first Remote's expansion port.
7. Repeat steps 4-6 for each additional Remote.



8. Note that the highest letter (e.g. "C") refers to the Remote connected directly to the display, while the lowest letter ("A") refers to the Remote furthest from the Display.

PakTrakr Current Sensor

1. The current sensor can monitor battery current or motor current (and no, they are not always the same).
2. The sensor may be placed on any cable – it makes no difference.
3. Current in excess of the sensor's rated capacity will have no adverse affect on the sensor or on the PakTrakr.

4. If the arrow on the top of the sensor points to a negative battery post the amps reading will be positive for charging and negative for loads.
5. If the cable and/or lug won't fit through the current sensor, use a short battery bus bar made of copper or aluminum, with one end fastened directly to the battery post, and the battery cable attached to the other end. The losses through a short bus bar will be negligible if properly connected. If you need a bus bar we can provide one.
6. The current sensor capacity (100, 200, 400, or 600A) is entered at power-up. (If a sensor is added later, the Display must be reset by momentarily unplugging the Remote's three-pin blue connector from the back of the Display.)
7. When prompted for a current sensor value, use the right button to scroll to the correct sensor value, then press the left button to accept and continue.

PakTrakr Serial Interface ES1

1. The ES1 serial interface works best with USB serial interfaces.
2. The serial interface may be connected or disconnected without removing power from the PakTrakr Display.
3. Once connected to an operating PakTrakr Display, the serial interface should be outputting data once per second. If it is not, it is likely a problem with the HyperTerminal program configuration. Check for correct COM port and correct baud rate settings (19200 baud, no parity, 8 bits, flow control=None), and check to make sure the port is "off hook" or connected.

PakTrakr Automatic Logging Serial Interface ES1R

1. The ES1R serial interface works best with USB serial interfaces.
2. The ES1R draws power from the PakTrakr Display, and therefore must be connected to the Display for programming, downloading, etc.
3. When connecting the ES1R to the PakTrakr Display for the first time it is advisable to connect a laptop to the ES1R and bring up HyperTerminal to verify proper operation and program the logging frequency.
4. If not programmed otherwise, the ES1R will by default log ALL data to memory until the entire 2MB is filled (usually in 5 hours or less, depending on how many batteries are being monitored.)
5. At each subsequent power-up, the ES1R will prompt for a command and wait two minutes for a response, providing the user an opportunity to download previously stored data before memory is over-written with new data. The data may be downloaded to a PC using the download ("d") command with HyperTerminal in "text capture" mode.
6. In any case, once connected to an operating PakTrakr Display and laptop (via HyperTerminal), the ES1R should display a command prompt OR begin outputting data once per second. If neither occurs, hit the "enter" key to bring up the command prompt. If neither the command prompt nor data appear, there is likely a problem with the HyperTerminal program. Check for correct COM port and correct baud rate settings (56400 baud, no parity, 8 bits, flow control=None).

PakTrakr Troubleshooting

Remote Troubleshooting

1. Troubleshoot and get each Remote working separately BEFORE trying to connect Remotes to each other or to the Display.
2. Disconnect all blue connectors from the Remote expansion ports and from the Display.
3. Use a voltmeter to check the voltage between the black lead and the green lead. If there is NO voltage between the black and green leads the PakTrakr is probably wired incorrectly, starting with the most POSITIVE battery and working down. Remember that the black and red leads should be on the most NEGATIVE battery in the sub-string the Remote is monitoring.
4. Disconnect the black lead from all Remotes to power them down.
5. Verify that the red lead is connected to the positive post of the most negative battery in the sub-string the Remote is monitoring, the green lead is connected to the next battery's positive terminal, the blue is connected to the next positive terminal, etc.
6. Re-connect the Remote's black lead to the negative post of the most negative battery in the sub-string (the SAME battery the red lead is connected to).
7. The Remote should start blinking within ten seconds. If it doesn't, disconnect ALL the leads from that Remote and then re-connect just the red and black leads. If the Remote still doesn't start blinking the fuse is blown or the Remote is damaged.
8. Once the LED is blinking correctly, connect the Remote's blue connector to the Display (without a current sensor or serial interface connected to the Display).
9. Verify that the Display boots up and that each of the Remote's batteries is being monitored. If the Display doesn't exit the "Calib..." screen, the blue connector might have a loose pin. Disconnect the blue connector from the Display and check that each pin is securely seated in the connector, then re-connect the blue connector.
10. Repeat steps 2-8 for each Remote.