

Techterm Repair manual

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The TechTerm is a hand-held ASCII terminal for use with computers, computer-controlled instruments or industrial machinery. It features various keypad configurations and a liquid crystal alphanumeric display showing 4 lines of 20 characters. The terminal provides user-selectable communications parameters, programmable function keys and other features that make it ideal for industrial applications requiring flexibility and solid, reliable operation.

In the United Kingdom, for the traffic light industry, Camdata has sold and supported this version for over twenty years:

TT1NEL-PW-R2-1-BK-Camdata

Which has:

- Supertwist Backlit 20x4 display,
- black case,
- RS232,
- fixed cable with Camdata custom 25-way male D-type pinning
- 45 key membrane keypad,
- powered from 5V DC (+/-5%)

Introduction

This manual has been written to allow our customers to repair the terminals themselves. Spare parts may be required and these are:

- Keypad (45 keys): part number: 92568
- Display (LCD: 20x4): part number: 92175
- Cable with Camdata custom D-type connector: 91033
- Test harness (Camdata provided), part number: 99999

The tools that you will probably require are:

- A small Phillips head screwdriver (older terminals) and
- A Torx screwdriver T6x75mm (for terminals less than about 5 years old)
- A 0.25"/6.25mm nut spinner
- A soldering iron with a small tip, if needed
- Solder and single core cable, if needed

- A working Techterm to check the operation of the faulty terminal
- An adaptor cable to connect the unit under test (UUT) to the working terminal and also connect to the 5V DC supply
- A 5V DC power supply providing at least 100mA. Perhaps via a USB power supply.

Instead of these last three items, it may be possible to simply plug the UUT into a traffic light controller, but as we have never had access to one of those, we cannot help.

Note that the Camdata part 99999 comprises two female 25-way D-type connectors to connect the test terminal with the UUT (Unit Under Test) so that transmitted characters are received by the other terminal and vice versa. There are also two flying leads to connect to a 5V DC power supply, providing power for both terminals.

Work area

Please use whatever anti-static precautions that your company prescribes. The technology inside the terminals is relatively low technology and in twenty years, we have never experienced a fault generated within our workshop, although we have had terminals returned for repair which are completely dead, possibly due to an over-voltage, or static discharge.

Diagnosis

We sometimes receive terminals with no cable, which of course cannot be powered up until a cable has been attached.

Hopefully, when you receive the terminal, you will have been told the problem by the user, but from experience that varies from “dead” to a specific fault, such as “bottom row of keys does not work”.

We have always recorded a list of returned terminals, the reported fault and any repair work, so we can check whether the same terminal is returned again with the same fault (that happens less than once every 5 years). That may not be necessary for you.

If the cable looks frayed or has become detached from the D-type connector or the grommet into the terminal, then you could try and repair the cable or replace it. To replace it – please skip to the “Opening the UUT” section.

Testing and fault-finding

First, you need to check whether the faulty terminal (Unit under Test – UUT) powers up and the LCD (Liquid Crystal Display) shows something.

Plug the UUT into the 99999 adaptor (or of course a traffic light controller) and apply 5V. A backlit terminal takes around 30-35mA and a non-backlit one around 20-25mA. The UUT may beep (most terminals have internal buzzers) and the display may then cycle through a self-test (configured in the setup menu) and display a flashing cursor.

If the UUT springs into life, then the next thing to check is the communication parameters.

Within the UK, all traffic signal controllers use either 1200 Baud or 9600 Baud. All are set to 7 data bits, even parity (enabled).

To enter the Setup menu, press CTRL, SHIFT and F1 simultaneously on the UUT.

If you can’t get into the setup menu, then one or more of those three keys has failed.

Now set up the test terminal with the same parameters – the only difference should be 1200 versus 9600 Baud. If you can’t get into the setup menu on the UUT, then you will need to try both 1200 and 9600 Baud on the test terminal to see if there is any communication.

Now press keys on the UUT and they should appear on the test terminal and vice versa. This is testing communication between the UUT and the test terminal and if it works in both directions, then please skip to testing the keypad.

If either the UUT does not display anything or communication does not work in one or both directions, you may have met the most common fault: one of the wires in the D-type connector has probably come loose.

Unplug the UUT from the 99999 and use a small screwdriver to open the D-type connector.

Another option would be to replace the cable, but that means opening the terminal and buying a spare cable, so, if you are willing to use a soldering iron, it is quicker and cheaper to repair the connector pinning.

Pinning

Looking at the rear of the connector, ie with the pins facing away from you (with the 13 pin row at the top and the 12 pin row at the bottom)), the usage and numbering (very small numbers next to each pin) are:

- Pin 10 is wired to pin 20 (on the bottom row)
- Pin 9 is commonly a white wire in the cable (+5V DC)
- Pin 7 is commonly a blue wire in the cable (ground for power and communications)
- Pins 4 and 5 are connected together (either a short cable or a solder bridge)
- Pin 3 is commonly a green wire in the cable (receive characters)
- Pin 2 is commonly a yellow wire in the cable (transmit characters)
- All other pins are not used.

Faults:

- No power (ie no display) – if a cable fault, then either pin 9 or pin 7 is disconnected
- No transmit (ie no characters displayed on the test terminal) – either pin 7 or pin 2 disconnected
- No receive (ie no characters displayed on the UUT) – either pin 7 or pin 3 disconnected

If these are all connected (it is worth pulling them **gently** to check) then the fault is either in the length of the cable, or inside the UUT.

Please use the soldering iron to re-connect the wire to the D-type pin, if any of these are disconnected, then test again, before you re-assemble the connector.

Then re-assemble the connector together and test once more.

If this now works – hurray – you have fixed the most common problem without needing any spare parts, but must now check all the keys are working.

If you have not yet got communications in both directions (UUT to and from the test terminal) then you will probably need to replace the cable, or the display has failed – skip to Opening the UUT.

Testing the keypad

It is important to check all the keys on the UUT – the F1 to F5 keys are tested within the setup menu (the onscreen menu shows which key does what), and then you should work through all keys.

Space on the bottom row does what it says, and Enter moves the cursor to the left-hand side of the display. You will have tested the CTRL and SHIFT when you entered the setup menu to check the communications parameters.

If all the keys work, then you should skip to “Re-testing the UUT” section.

If any of the keys doesn’t work, and the normal failure modes are a failed complete row or complete column, then you will need to open the UUT.

Opening the UUT

There are the reasons to open the UUT:

- a) No display
- b) Keypad fault
- c) Replacing the cable
- d) Something more difficult to diagnose

This operation is more complex and requires greater skill. It may be better to scrap the terminal and order a new one.

The display not working could be due to any of these:

- a) Cable issue – either within the D-type (which you have already checked), or within the cable (visual check only) or within the terminal (very rare)
- b) A faulty display – commonly this shows as the backlight (if the terminal has one) illuminating, but no cursor or characters. The display may have a dark patch on it, or some pixel rows or columns continuously dark.
- c) A motherboard fault – rare (perhaps one in 50 repairs) and the UUT is then irreparable (or rather, it will cost more to repair than a new terminal)

The keypad fault is obvious – one or more keys/rows/columns (or the whole assembly) has failed.

The cable should be replaced only after the D-type has been checked. Of course, you could replace the cable and then another fault appears. That's fault-finding for you!

To open, you need to remove the six screws in the base. A few years ago these used to have a small Phillips head, and now have a Torx head.

This can be quite difficult, especially if the UUT has been opened previously.

Once the base has been lifted away from the upper part, you may need to unplug the buzzer. This is a push fit 2 pin connector, that can be inserted in only one orientation.

If you are replacing the cable, please bear in mind that all cables from us have a small 6-way connector and very old units (pre-2012?) have a much larger internal connector, which is not compatible. The 6 way connector can be inserted in only one orientation.

Faulty display

This is a simple plug-in replacement – simply make sure that the inline connector is lined up correctly.

Faulty keypad

This is by far the most complex repair operation.

The display should be unplugged and the yellow plastic spacer removed.

The six nuts holding the motherboard should be removed with a nut spinner. You can then gently push the motherboard up the 6 pillars using the keypad. Once that is off, you can unplug the keypad and replace it with another one. This should be done with care – removing is easy, but as it is a flexi-circuit pushing into a special connector, this needs lining up and then pressure applying.

Although fiddly, it is probably worth checking the new keypad works at this point, before putting the keypad/motherboard back into the case, by plugging in the cable and a display and typing keys on the keypad (hopefully displayed on the test terminal).

Re-assembling is also fiddly. The keypad should be pushed onto the 6 pillars first, followed by the motherboard. The 6 nuts should be tightened onto the pillars.

Replace the yellow spacer and then the LCD..

Re-closing the UUT

Don't forget to plug the buzzer connector back in and ensure the cable grommet is lined up with the case halves. And ensure the yellow plastic spacer is in place, if you have removed it.

Don't overtighten the screws as you may then snap the mounting pillar from the front of the case.

If a screw is missing or a pillar has been snapped, then using 5 screws is OK. Using 4 may lead to a little dust or water ingress.

Re-testing the UUT

Providing all the keys have been tested earlier, then this is simply a matter of checking a few keys on the UUT and the test terminal and if all work, then return the UUT to the user within your organisation.

We clean the keypads before returning, to remove any dirt/grease, but this is not necessary.

Please bear in mind that about 1 in every 4 terminals sent in for repair have no fault.