



# JED MICROPROCESSORS PTY LTD

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The T510 is a small PCB or boxed Tiger system intended for applications needing two RS232 and/or RS485 serial communications ports, with a small amount of parallel I/O. It uses the 28-pin E-Tiger with memory options up to 512 kByte FLASH and RAM.

There are several application areas for this system:

- RS232 serial to 5 FET outputs and 8 protected inputs, for example, as a remote LCD projector controller;
- RS485 serial network (opto-isolated) to 5 FET outputs and/or 8 switch or logic inputs, with 8 DIP switch inputs to set a network address;
- RS485 serial network (opto-isolated) to RS232 serial I/O, with protocol conversion, address recognition, address field stripping, or any other data massaging; or
- (With a small jumper) RS232 in, RS232 out protocol converter, data buffer, I/O device, etc.

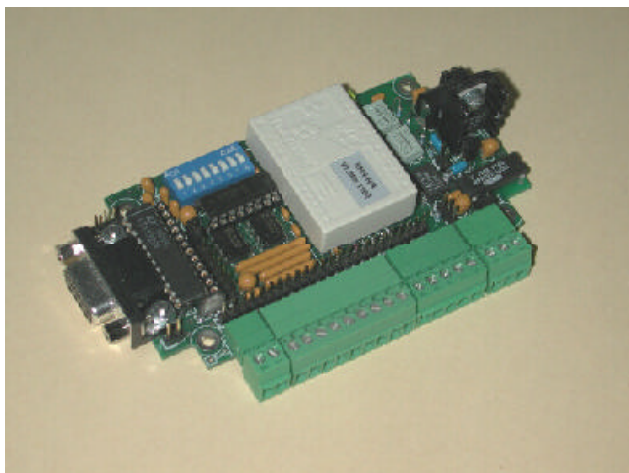
The FLASH-based memory in the T510 is easily programmed via a 3-pin cable adapter from an RS232 port on a PC, and the system software is written in the powerful compiled Multi-tasking BASIC for the Tiger system.

## Pre-written device drivers

As with all Tiger based systems, the Wilke pre-written device drivers make application of the T510 easy. Buffered serial routines are provided, operating under interrupt, with variable length buffers on each of the two serial channels, with automatic RS485 TX-On functions, and options of 9-bit RS485 address mode, automatic address matching.

## Multitasking built in

The Tiger BASIC includes a 32 task multitasking system ... users define tasks to run concurrently and can start or end tasks at will. Task priorities can be set-up by the user, and pauses in task execution can be generated by the WAIT\_DURATION statement which releases that task, allowing other tasks to make use of the waiting period.



## T510 ... an E-Tiger based RS232/RS485 serial controller with thirteen user I/O lines

- Two serial ports, one RS232, one either RS232 or RS485 (opto-isolated);
- Eight digital inputs for switch to ground or voltage inputs;
- Four 250mA FET outputs and one 2 Amp FET outputs; and
- Easily programmed in Wilke Tiger multi-tasking BASIC, using powerful device drivers for serial I/O (including RS485 9-bit mode).

## Serial Channel 0 (D9)

This channel is connected via RS232 transceivers to the D9 connector on one end of the card or box. The RS232 driver chip can be installed in two (overlapping) positions on the board, allowing this interface to be configured as either a DTE (Data Terminal Equipment) device or DCE (Data Communications Equipment) device.

In DCE (i.e. "look like a modem") mode, lines provided on this connector are:

- TX out (pin 2), Transmit Data;
- RX in (pin 3), Receive Data;
- RTS out (pin 8), Request To send, Tiger L84;
- CTS in (pin 7), Clear To Send, Tiger CTS in;
- DCD out (pin 1), +9 volt drive when T520 powered;
- DSR out (pin 6), +9 volt drive when T520 powered.

In DTE (i.e. "look like a PC") mode, the lines are:

- TX out (pin 3), Transmit Data;
- RX in (pin 2), Receive Data;
- RTS out (pin 7), Request To send, Tiger L84;
- CTS in (pin 8), Clear To Send, Tiger CTS in;
- DTR out (pin 4), +9 volt drive when T520 powered.

Link L14 allows CTS and RTS to be linked internally.

## Serial Channel 1, Download, RS232/485

The second serial channel has both RS232 and RS485 options.

In RS232 mode, one TX and one RX line are provided to a three-pin internal strip connector, L7. This connector is used for downloading where a connection to a PC allows a new program to be downloaded to the FLASH memory inside the Tiger, either directly from the BASIC compiler, or from a separate “downloader” program (where binary data only is distributed to a customer, preserving the security of the source).

To start a download, the PC switch (SW2) is switched ON and the unit is RESET.

If RS232 is needed on a second outside serial port, the unit should be ordered with a three-wire link to the second serial port connector, J6, giving TX, RX and Gnd.

If RS485 is needed on the second serial port, alternate internal linking uses the opto-isolated RS485 components, and RS485 data appears on J6 (+, - and Gnd).

## RS485 system

Two opto-isolators are provided in the outgoing direction, one for TX data from SER1, and one for TX-Enable (generated by the Tiger serial device driver with a special parameter in the INSTALL command).

One opto-isolator is provided in the reverse direction for received RS485 data to be fed to the Tiger.

A half-duplex RS485 transceiver device sends and received data on a 2-wire line (plus ground) on J6.

Two option links are provided. One can select a 120 ohm line termination on the RS485 line. The second disables the receiver during transmission, so that transmitted data does not enter the receiver and “clutter it up”.

Power for the opto-isolated side of the RS485 system is provided by a low-noise DC-DC converter with a post-regulator.

## External Inputs to the T520

Eight external inputs on J1 can be installed on the T520, allowing external signals to be read by the Tiger, and used. Two modes are provided for these inputs:

- Switch inputs, for external signals connecting to ground. Pullups on the board to 5 volts pull each pin HIGH when the input is OFF; or

- Voltage inputs for external signals in the three to 24 volt range. Resistors are installed as pull-downs, so that a LOW is registered when no input signal is present.

The pull-up and pull-down resistors are in SIP-packs which plug into socket-strips in two groups, allowing four resistors to pull up and four to pull down, splitting the inputs into two groups, or all eight to pull up or pull down.

## Internal Switch inputs to T520

An 8-way DIP switch is readable via a shift register. This can be used to set constants, select program options, set addresses in an RS485 network, etc.

## 250mA FET Outputs

Four outputs to J8 are N-channel FETs with a 250mA rating. The fifth pin on this connector can be ground or +5 volts Vcc, chosen by a link.

The FET outputs also connect to their output pins via links. These can be zero-ohm shunts or current limiting resistors (used when these outputs are used for driving LEDs) The fourth output can alternatively be linked to 5 volts, to supply regulated power to external devices.

The FET outputs all have clamp diodes to a 50 volt Zener diode, allowing these outputs to drive relays or other inductive loads without flywheel diodes being needed.

## 2 Amp FET output, with other options

One pin on the Tiger, L33, can be used in a number of ways with connector J5.

The normal board loading is to use a 10A power FET (MTD3055L) driving this pin. This output is rated at 2A continuous. It is voltage-clamped with an internal protection system.

This pin can also be used for Tiger special functions, such as driving a Dallas 1-wire line, or for pulse or frequency input measurement functions, or even as an 8-bit analog input (using Vcc as a voltage reference).

## Upstairs

A row of pins at 0.1 inch centres allows all the I/O pins and a number of Tiger pins to be picked up on a second board above the main board. Upstairs could be used for 8 analog input channels, a real time clock (with power control), a DataFLASH memory, or other functions turning the board into a small data logger or data acquisition system on an RS485 or RS232 network.

These pins can also be used as connectors for internal switches and LEDs if the entire system is installed in a OKW Flat pack box, (120mm by 65mm by 40mm) and no edge-connectors are needed, making a clean-edged case.

## Power requirements

If the RS485 interface is NOT used, power consumption is under 100mA, and the unit can be run from a 9 to 12 volt unregulated power source. If the RS485 interface is installed, the current drawn is 150mA, so a 6 volt 200mA regulated plug-pack powers it safely. JED can supply suitable power packs.

