

TS-9500 Manual





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All modifications from previous versions are listed in the appendix.

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Limited Warranty

Technologic Systems warrants this product to be free of defects in material and workmanship for a period of one year from date of purchase. During this warranty period Technologic Systems will repair or replace the defective unit in accordance with the following instructions:

- Contact Technologic Systems and obtain a Return Material Authorization (RMA) number and a copy of the RMA form.
- Fill out the RMA form completely and include it and dated proof of purchase with the defective unit being returned. Clearly print the RMA number on the outside of the package.

This limited warranty does not cover damages resulting from lightning or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Technologic Systems be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs made after the expiration of the warranty period are subject to a flat rate repair charge and the cost of return shipping. Please contact Technologic Systems to arrange for any repair service.

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1. Introduction

The Technologic Systems TS-9500 is a valuable tool when developing for any Technologic Systems Single Board Computer (SBC). It features a Compact Flash interface, standard VGA video connector, and standard connectors for a PS/2 Keyboard and Mouse. The TS-9500 daughter board allows for a developer to write source code, compile, run, and debug right on the target SBC using a typical PC compatible development suite (such as Borland's Turbo C). By simply moving your development tools onto the Compact Flash card, and plugging in monitor and keyboard, one can develop and debug directly on the target platform.

2. PC/104 Bus Interface

The TS-9500 features a 16-bit PC/104 Bus that is compatible with Technologic Systems 3000 and 5000 series of SBC. These products use a standard PC/104 bus except that pin A1 is used for the IRQ1 function (instead of the NMI function). The TS-9500 keyboard controller uses this interrupt for keyboard input (as per a standard PC). This is a non-standard usage for this PC/104 Bus pin, but there is little chance of a conflict, since the standard function of this pin is "Parity Error" for extended memory daughter boards, which should never be needed with our products.

I/O locations 198h through 019Fh are used by the TS-9500. When installing other PC/104 daughter boards, the user must ensure that there is no conflict with these I/O locations.

Although the TS-9500 uses the full 16-bit bus, it can support SBC products with only an 8-bit bus (such as the TS-3100). All resources except the Compact Flash can function with a restricted 8-bit bus. When using an SBC with an 8-bit bus, the Compact Flash will be non-functional.

3. VGA Video, Keyboard, and Mouse

No special cables are needed to use the VGA, keyboard, and mouse interfaces. Simply plug in your monitor into the TS-9500 VGA connector as you would for any other typical PC computer. A PS/2 keyboard plugs into the connector labeled **KeyBoard** (farthest from the VGA connector). A PS/2 mouse plugs into the connector between the VGA connector and the Keyboard connector. The TS-9500 uses a Chips and Technology 65545 chip for the VGA video generation and it uses an Intel 82C42PC chip with Phoenix Technologies Ltd. firmware for the keyboard and mouse controller.

The mouse interface requires IRQ12 support. The TS-5300 uses IRQ12 for the Ethernet port and therefore will not support a PS/2 mouse. The 3000 series of products have no BIOS support for a PS/2 mouse. If you wish to use a mouse on these products, a serial mouse will work fine (using a COM port).

The other TS-5xxx series of SBC products do support a PS/2 mouse using the TS-9500.

4. Compact Flash

A Compact Flash card allows for efficient, reliable, and easy transfer of files from a Host PC to the TS-9500. A SanDisk USB Compact Flash reader/writer (which can be purchased from Technologic Systems) is recommended for the host PC for reliable file transfers. This results in the ability to quickly move files from a host PC to the TS-9500 using a Compact Flash Card as the removable media.

The TS-9500 is shipped with DIP Switch #5 in the "ON" position setting the Compact Flash as the Primary IDE device. If the main SBC has a Compact Flash Card installed, then the TS-9500 Dip Switch #5 must be put into the "OFF" position to make the Compact Flash on the TS-9500 the secondary IDE device to avoid conflicts. The Compact Flash Card on the SBC (if installed) is always the Primary IDE device.

While a USB Compact Flash reader allows for hot swapping of the Compact Flash card on the host PC, the Compact Flash interface for the TS-9500 is not hot swappable, the target SBC must be rebooted after removing or installing a Compact Flash Card.

The Compact Flash requires a 16-bit bus interface. When using an SBC with an 8-bit bus, the Compact Flash will be non-functional.

5. Using the SanDisk USB Compact Flash Reader

This device allows for a very fast and reliable method of moving files between the host PC and target SBC. For best results, we have noticed that it is best to boot the host PC with a Compact Flash Card installed in the SanDisk USB Reader. The Compact Flash Card can then be hot swapped (inserted or removed without rebooting the host PC).

For some OSes (Windows ME), it may work better to remove the USB cable from the USB port and reinstall it after hot swapping CF cards. There is typically no need to reboot the PC.

6. Using LCD, Matrix Keypad with TS-9500

If a TS-9500 VGA video board is installed on the PC/104 bus, the video BIOS on the graphics card will automatically replace the standard video routines (INT10h) in the BIOS, disabling both the LCD display and the console redirection to COM2, regardless of the state of jumper **JP2**. If a TS-9500 is present, all console input is disabled and the SBC will only accept input from a standard PC keyboard.

If an LCD and/or Matrix keypad is enabled, the console must be directed to standard I/O. If a TS-9500 is present, with video/keyboard enabled the standard output will be directed to video, even if the LCD is enabled, if the Matrix keypad is enabled the PC keyboard and the Matrix keypad will work at the same time.

Contact Technologic Systems for more information on using the LCD and Matrix Keypad with Keyboard and VGA on a TS-9500.

7. Booting from TS-9500

The BIOS in the TS-9500 can be used to boot the attached SBC. Setting Dip Switch #1 "ON" will cause the BIOS in the TS-9500 to be executed instead of the BIOS firmware on the SBC. This can be useful if the main SBC flash chip has been corrupted. Setting the Dip Switch #1 to the "OFF" position will cause the boot process to revert to the normal method using the BIOS in the SBC Flash chip.

When DIP Switch #1 is "ON", then DIP Switches 2 and 3 must be selecting the correct SBC BIOS. (See Section 11 – DIP Switch Settings)

8. Using the TS-9500 with a TS-3100

Current versions of the TS-3100 do not support IRQ1 on the PC/104 Bus pin A1. This function is required for proper operation of the TS-9500 keyboard controller since the PC standard uses IRQ1 for keyboard input. These products must have a jumper soldered on the SBC from DIO1 port pin 14 (IRQ1) to the PC/104 Bus pin A1. Future "Revision B" TS-3100 boards will not need this jumper added.

For development with a TS-3100, we suggest using a TS-3200 SBC.

9. Using the TS-9500 with a TS-2100, TS-2200, TS-2800

Although these products were not originally designed for use with the TS-9500, it is possible to get some functionality. DIP Switch #1 must be in the "OFF" position. This will cause the SBC to boot using its own BIOS firmware. The VGA video will function as expected. But none of the other functions on the TS-9500 (Keyboard, Mouse, Compact Flash, Flash drive) will function due to BIOS limitations of these products.

10. Jumper and Dip Switch Settings

JP	Setting
1	Write Enable for the Top 512K bytes of Flash chip. <i>Note: This region contains critical firmware and normally should not be changed.</i> <i>See section Error! Reference source not found. for more information.</i>
2	User Jumper

Table 1: Jumper Settings

Dip Switch	Setting	Shipping Default
1	Boot From TS-9500	Off
2	<ul style="list-style-type: none">• ON = boot a 3000 series SBC• OFF = boot a 5000 series SBC	Off
3	Reserved	Off
4	User	Off
5	Compact Flash IDE device setting. Dip 5 = On <ul style="list-style-type: none">• Primary IDE Device Dip 5 = Off <ul style="list-style-type: none">• Secondary IDE device	On
6	Mouse IRQ – connect to IRQ 6	Off
7	Reserved	Off
8	Enable VGA Video BIOS extension and Enable Keyboard controller	On

Table 2: Dip Switch Settings

Appendix A I/O Memory Map

Hex Address	Resource
19D	Board ID = 05Fh
19B	Bits 0 – 7 = Dip Switches 1- 8
19A	<ul style="list-style-type: none">• Bit 0 = Led On/Off (1 = ON)• Bit 1 = KB IRQ• Bit 2 = Mouse IRQ• Bits 3 – 5 = Reserved• Bit 6 = JP1 (1 = ON)• Bit 7 = JP2 (1 = ON)

Appendix B Manual Revisions

Date	Revision
12.03.2001	Document Created
10.22.2003	Minor editing
07.09.2009	Updated Mailing address