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TechMemo #01-0013

PRIORITY:	Normal
DATE:	December 6, 2001
TITLE:	Troubleshooting AlphaEclipse™ 1500 Time and Temperature Slave Signs
ECO REFERENCE:	N/A
PRODUCT(S) AFFECTED:	AlphaEclipse™ 1500 series signs
SUMMARY:	The purpose of this document is to aid in testing and troubleshooting AlphaEclipse™ Time and Temperature Slave display units.

Introduction

The purpose of this document is to aid in testing and troubleshooting AlphaEclipse™ Time and Temperature Slave signs.

This document applies to the AlphaEclipse™ Time and Temperature Slave display using the firmware part number 1165 6003, current revision 1.01.

Recommended testing: factory testing

This testing is recommended for units within the factory to be fully tested. This would encompass new production units, units returned to the factory for repair or factory refurbished units. These tests could also be performed out in the field (although labor intensive), or performed within an authorized service center.

The following tests should be run in the order listed for comprehensive testing. Also these tests can be run individually for trouble shooting and diagnostics.

Whenever the DIP switch settings are changed, the power will have to be cycled on the unit for these changes to come into effect.

Initial setup

First setup unit, with the ‘6003 chip installed, no connection to a master unit or master unit simulator. Set all of the DIP switches in bank 1 to off. DIP switch banks 2 and 3 are not used and their states are irrelevant.

Test ancillary functions

Firmware identification

Table 1: DIP switch bank 1

DIP switch	Function	State
1 and 2	Test select	Don't care when test mode is off
3	Test Mode	off
4 - 7	Dimming control	Don't care for now, but set to off if doing all the tests in the following order
8	reserved	Don't care, but set to off for future compatibility

Power up the unit and observe the firmware identification that is displayed for the sign-on message. First the product number is displayed; 1165; AlphaEclipse™ Time and Temp. Then the chip number; 6003; Slave display unit (note the "6" won't be fully displayed on 3 1/2-character units). And finally the firmware version number; version major/minor format (i.e. 101 is 1.01). This firmware identification will be needed when calling the service department.

Display function

Table 2: DIP switch bank 1

DIP switch	Function	State segment test	State lamp test
1	Test Select	off	on
2		off	off
3	Test Mode	on	3
4 - 8		Don't care	4 - 8

Either the segment scan or the lamp test will verify that the display is functional. These tests can verify that the display is operational and all of the segments work.

The segment scan test does not exercise the 'corner' segments. It is recommended that the lamp test be run to verify that all of the display works, then to run the segment scan test to make sure that none of the segments are shorted together.

Internal temperature sensor test

Table 3: DIP switch bank 1

DIP switch	Function	State
1	Test Select	off
2		on
3	Test Mode	on
4 - 8		Don't care

Run the test on the internal temperature sensor to verify operation. This is important from the standpoint that these units employ a high temperature dimming function. Should the internal temperature sensor fail, the internal high temperature dimming will either not work at all, or force the unit to dim or blank.

This test reads the internal temperature sensor and displays it in degrees Centigrade.

It will also perform the internal high temperature dimming process. This means that the data that is read from the internal temperature sensor is used to determine if to dim or blank the display.

IIC Bus device scan test

Table 4: DIP switch bank 1

DIP switch	Function	State
1	Test select	on
2		on
3	Test Mode	on
4 - 7		Don't care

The IIC (I squared C) bus is an internal bus connecting the micro controller chip to the on board peripheral components (sensors). Each of these devices has two addresses. This enables the micro controller to exclusively communicate with each one for both read and write operations.

The test runs by scanning all of the available addresses and displays those addresses where the applicable device has responded.

The display format is the letters 'Ad' (for address) followed by two hexadecimal digits.

NOTE: Note on 3 1/2-character display units, the 'A' will not be completely displayed.

Table 5: IIC bus address

Address	Device	Notes
Required on Slave units		
40	Port expander	Dimming sensor
41		
92	Internal temperature	
93		
Not required or used on Slave units		
90	External Temperature sensor	Unplug and remove.
91		
A2	Real Time Clock Chip	
A3		
A4	Static Ram	
A5		

Note that each device has a consecutive even and odd address.

Test stand alone operation

Table 6: DIP switch bank 1

DIP switch	Function	State
1 & 2	Test Select	Don't care
3	Test Mode	off
4, 5, 6	Dimming Level	Off; no dimming
7	Master Dimming	On; Master dimming
8	reserved	Don't care, set to off

Run this test with no serial communication from a master.

Power up the unit, the firmware identification will be displayed, then the display will display 4 dashes.

Functional testing

For the following tests you will need:

- Serial communication cable
- Dimming sensor, or switch with connector and cable
- Master control unit

Data reception and master dimming

Table 7: DIP switch bank 1

DIP switch	Function	State
1 & 2	Test Select	Don't care
3	Test Mode	off
4, 5, 6	Dimming Level	Don't care when set for master dimming
7	Master Dimming	On; enable master dimming
8	reserved	Don't care, set off

First start the unit up with the serial cable from the master disconnected. The display will cycle through the firmware identification sign on message and then display the 4 dashes. Plug the serial cable in. The display should now reflect the masters display. Let run for a minute or so. Unplug the serial cable and in approximately 15 to 20 seconds the display will return back to displaying the 4 dashes.

Make sure that the master is setup for dimming. Toggle the master dimming sensor input, either by placing a thumb over the sensor and removing. Or, if a switch is used, toggle the switch. Observe that the slave dims as instructed by the master.

Slave dimming

Table 8: DIP switch bank 1

DIP switch	Function	State
1 & 2	Test Select	Don't care
3	Test Mode	off
4	Dimming Level	off
5		off
6		on
7	Master Dimming	off
8	reserved	Don't care, set off

The slave can be setup to dim by itself with 8 dimming levels. Toggle the dimming sensor input either by placing a thumb over the sensor or if using a switch instead, toggle the switch. Note the display dimming and returning to full brightness.

Diagnostics and troubleshooting

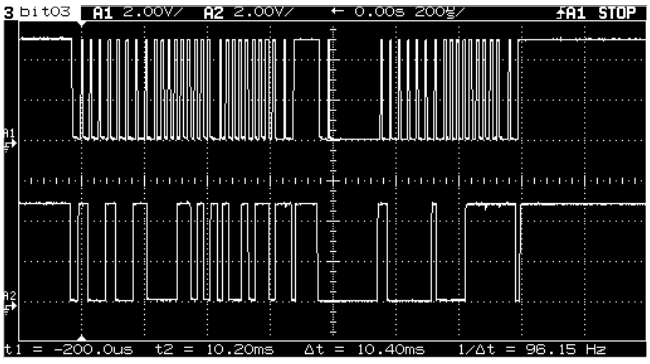
On board temperature sensor does not work

If the on board temperature sensor test fails, run the IIC bus device scan test. The address for the internal temperature sensor may not be shown if the device does not exist, or if no addresses are shown which would indicate that the IIC bus is not working.

Missing IIC bus address

If the device is not present or not functional; its address will not be displayed. Or possibly no addresses are displayed. This would be caused by a severe disruption in the IIC bus, from such things as a shorted device or a short on the board etc.

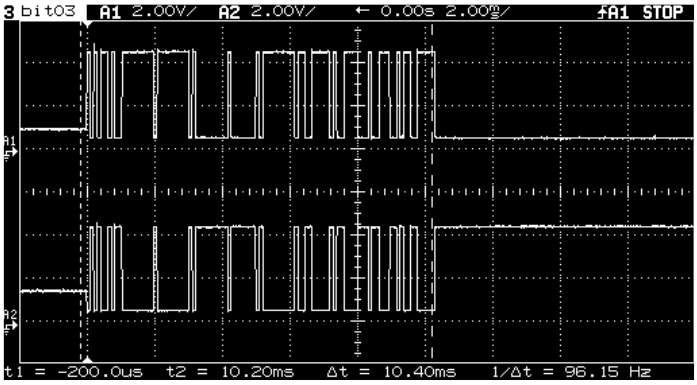
This shows the IIC signals. The top trace is the Serial Clock signal and the lower is the serial data signal.



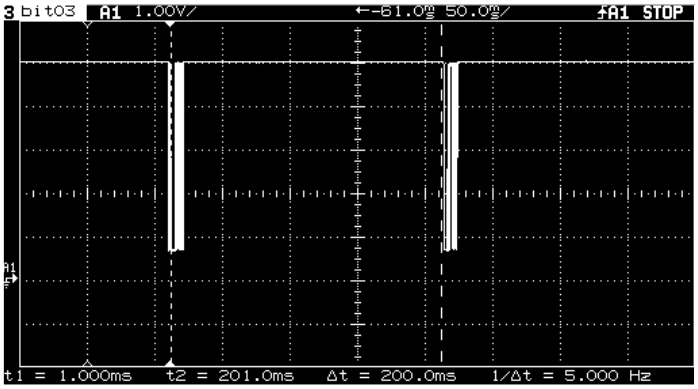
Slave only displays 4 dashes

This would be caused by the serial data not getting to the slave. Check cable and

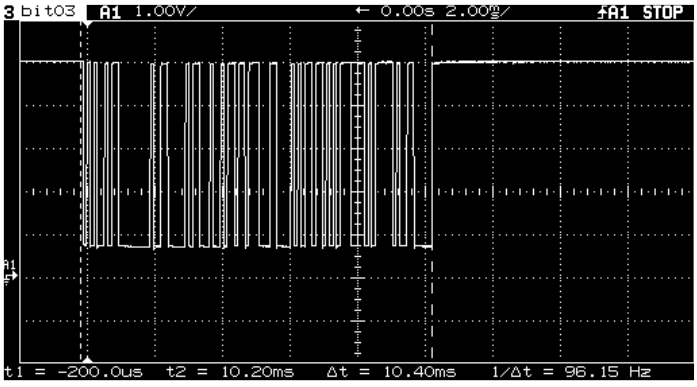
connections. With an oscilloscope the serial data packets can be observed.



This is the incoming data on the serial connector. This is a RS-485 differential signal, and there must be signal on both inputs.



This shows the input on pin 11 of the micro controller. This is the received data input. Each packet is approximately 200mS apart.



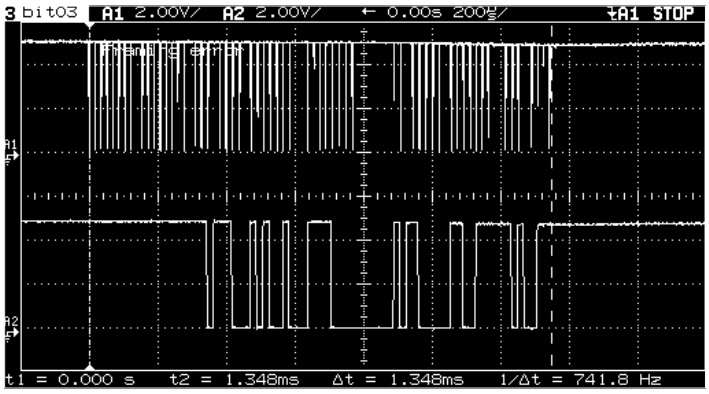
This is the receive data input to the micro controller pin 11. This is the same signal as above, but magnified to show the data within the packet. This packet is approximately 10 mS long.

For more detailed information on packet construction, see the firmware specification document.

Display does not work

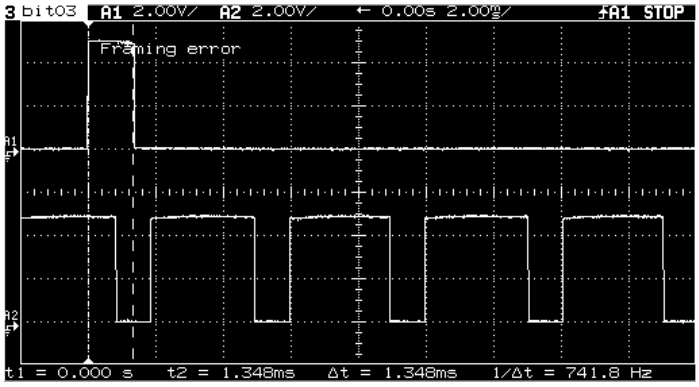
Either no display or missing digits. Check cables and connection from the micro controller board to the display boards. Make sure that the display boards are properly wired up with both the power wires and turbo cable.

Also make sure that the display is not in the high temperature dimming or blanking mode (run internal temp sensor test).



This shows the turbo clock signal on the top trace and the turbo data signal on the lower.

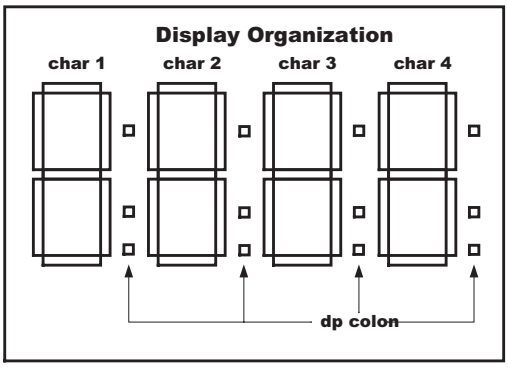
These signals were taken at the turbo port connector.



This shows the turbo strobe signal on the top trace. The lower trace is the output enable signal.

This output enable signal will change depending on the amount of dimming. Also, the output enable signal is produced from an internal timer interrupt service routine and would be asynchronous to the strobe signal.

Appendix A: Display organization



Appendix B: DIP switches