TinyTech

TinyTech will help you troubleshoot your MIDItools Computer.

Setup

- With the power switch OFF, connect a power supply to the MIDItool Computer power supply input.
- Connect a MIDI cable between the MIDItool Computer's MIDI IN and MIDI OUT.
- Install TinyTech.
- Turn on the power switch.
- Adjust the LCD Contrast trimpot for the best viewing contrast.

General Overview

TinyTech will help you determine if any of the following components/modules are connected improperly: the liquid crystal display (LCD); the LCD backlight; the 8 pushbutton switches; the 16 LEDs; the A-to-D converter; the data potentiometer; the MIDI circuitry; and the EEPROM circuitry (if applicable).

The basic troubleshooting process is:

[1] *Run each test in the order given.*
[2] *If the test results differ from those given, you have found a problem.*
[3] *Turn the power off.*
[4] *Study the components listed in the "Possible Problem Area" section of each test instruction.*
[5] *After you have found and corrected a suspected problem, repeat the failed test.*

LCD Test

When power is first applied, the LCD displays the standard MIDItools initialization screen. (A box opens up; the word "MIDItool" comes out; an "s" is spit out.) Next, "Hardware Diagnostics" is briefly displayed. All LEDs will be OFF. The LCD yellow-green backlight will be lit (if you are using PAVO's backlit LCD). The LCD must be working (with or without a working backlight) to continue with the next test.

Problem: *The backlight is not lit.*
Possible Problem Area: *LCD ribbon cable wires 1 and 16 are reversed or are not soldered to the proper pad area.*
Problem: *The display does not show the initialization screen.*
Possible Problem Area: *The LCD ribbon cable connections are shorted or miswired.*
Possible Problem Area: *The LCD contrast trimpot has not been properly adjusted.*

Switch Test

Once the initialization LCD screen is finished, you will see the following test pattern:

```
|Switches * o o o|
| $00 o o o o|
```

Be aware that SWITCH S1 is the second switch from the left in the top row of switches (see the Human Interface Board Assembly Instructions, or page 123/124 of Digital Projects for Musicians). Press and hold SWITCH S1. The display will show address $04 while you hold the switch down. When you release the

switch, the address display will return to $00 and the S1 indicator box (the box immediately to the right of the asterisk) will be filled in. Each successive press of this switch will toggle the display box ON (filled in) and OFF (not filled in).

Repeat for SWITCHES S2-S7. Do not press SWITCH S0 yet. (If you do, keep pressing it until you return to the switch test pattern.)

When you hold down SWITCH	TinyTech will display address
S0	N/A
S1	$04
S2	$01
S3	$02
S4	$80
S5	$40
S6	$10
S7	$20

Each press of the switch toggles its display box between ON (filled in) and OFF (not filled in).

Problem: *A switch is not working.*
Possible Problem Area: *Switch is shorted.*
Possible Problem Area: *Resistor RP1 is oriented backwards.*
Possible Problem Area: *The ribbon cable (H/I to CPU Board) is connected improperly.*

Analog-to-Digital Conversion (ADC) Test

With the switch test pattern showing, press SWITCH S0. The ADC test pattern is displayed:

```
|--- ADC --- LED|
|hh FF FF gg xx|
```

where hh=00-FF, gg=00-FF, and xx=1-16. The hex values are displayed for the four A/D converters. The first one, with value hh, can show any value in the given range. This is the converter wired to the data potentiometer. The second and third converters are connected to circuit VCC (5V); therefore, they should be displaying hex value FF. (Due to a different Human Interface board, the Handheld MIDItools units will show 00 rather than FF). The final converter, with value gg, can show any value in the range shown; this converter is wired to the expansion connector and left "open" or floating. As you turn the data potentiometer, two things happen at the same time: the value, hh, moves between hex 00 (fully counterclockwise) and hex FF (fully clockwise); and, for every change in ADC value (hh) of 16, a different LED will light. Only one LED will light at any given time. The LEDs light as shown in the table below:

When the data pot value is hex	TinyTech will light LED	TinyTech display will show "LED"
00-0F	D1	0
10-1F	D5	1
20-2F	D9	2
30-3F	D13	3
40-4F	D2	4
50-5F	D6	5
60-6F	D10	6
70-7F	D14	7
80-8F	D3	8
90-9F	D7	9
A0-AF	D11	10

```
B0-BF                   D15                  11
C0-CF                   D4                   12
D0-DF                   D8                   13
E0-EF                   D12                  14
F0-FF                   D16                  15
```

For LED designations, see page 122 of the book or the Human Interface Board Assembly Instructions.

Problem: *The second and third converters are not showing value hex FF.*
Possible Problem Area: *The Human Interface ribbon cable is misaligned or has solder problems.*
Problem: *The fourth converter value is constrained to hex 00 or hex FF.*
Possible Problem Area: *The expansion cable connector on the CPU Board has solder problems.*
Problem: *The data pot seems backwards.*
Possible Problem Area: *The data pot wires are connected backwards.*
Problem: *One LED does not light.*
Possible Problem Area: *The LED is inserted backwards.*
Possible Problem Area: *The 1K resistor connected in series with the diode is the wrong value.*
Problem: *LEDs D3, D7, D11, D15, D4, D8, D12, and D16 do not light.*
Possible Problem Area: *U2 (74HC595) is improperly installed.*
Problem: *LEDs D1, D5, D9, D13, D2, D6, D10, and D14 do not light.*
Possible Problem Area: *U1 (74HC595) is improperly installed.*

MIDI Loopback Test

This test verifies that MIDI data is properly transmitted and received by your MIDItools Computer. Make sure that a MIDI cable is connected between the MIDItools Computer's MIDI IN and MIDI OUT. With the ADC test pattern showing, press SWITCH S0. MIDI loopback testing commences; the display shows:

```
                     |MIDI |
                |Testing Loopback|
```

If the MIDI circuitry is operating properly, the display will end up showing:

```
                |Test Complete |
                |0 MIDI Errors |
```

Problem: *Errors are detected.*
Possible Problem Area: *Resistor R3, R6, R7, R8 or R18 (CPU Board) is the wrong value.*
Possible Problem Area: *U5 (74HCU04) is inserted incorrectly.*
Possible Problem Area: *U2 (6N138) is inserted incorrectly.*
Possible Problem Area: *MIDI jacks are shorted or unsoldered.*

EEPROM Read/Write Test

This test verifies that data is properly transmitted and received by the EEPROM. Note that, unless you have ordered a MIDItools kit which requires an EEPROM, you will not have an EEPROM plugged into the socket for U3. The test will operate without the EEPROM chip installed, but will display 256 EEPROM errors. With the MIDI loopback test pattern showing, press SWITCH S0. EEPROM read/write testing commences; the display shows:

```
                     |EEPROM |
                |Testing... |
```

If the EEPROM circuitry is operating properly, and the EEPROM is installed in the socket for U3, the display will end up showing:

```
|Test Complete |
|0 EEPROM Errors |
```

Problem: *Errors are detected.*
Possible Problem Area: *U3 (X25C02) EEPROM is improperly installed*

Switch S0 Test

With the EEPROM test pattern showing, press and hold SWITCH S0. The switch test pattern returns and displays address $08. The asterisk will remain. Don't worry; if you got to this point, SWITCH S0 works fine.

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