

Enabling the Z67-IDE+ with I2C to support Arduino LCD and RTC modules

Purpose:

- To eliminate the BDC switches as requested by multiple users.
- To have a visual indication of the overall health of the controller

Future Updates:

- Move serial port Main Menu to the LCD display.
- Add keypad support to control Main Menu selection.

Arduino I2C modules:

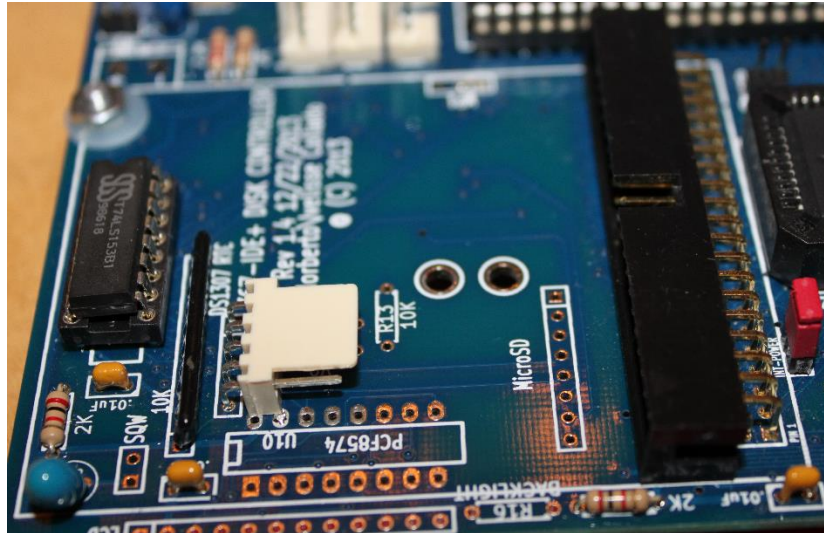
- LCD with I2C: (US – 1pcs for \$8.48)
 - o <http://www.ebay.com/itm/Blue-Serial-IIC-I2C-TWI-2004-204-20X4-Character-LCD-Module-Display-For-Arduino-/201469984267?hash=item2ee88bfe0b:g:LngAAOSwZVhWTjA7>
- RTC module: (US – 2pcs for \$3.00)
 - o <http://www.ebay.com/itm/2PCS-DS3231-AT24C32-IIC-precision-Real-time-clock-module-memory-module-Arduino-/321929959318?hash=item4af4855796:g:BEoAAOSw8-tWVJxo>
- Pushbutton Switches: (US – 2pcs for 3.93)
 - o <http://www.ebay.com/itm/New-Mini-Push-Button-SPST-Momentary-N-O-OFF-ON-Switch-10mm-Green-/291117739270?hash=item43c7f82d06:g:R70AAOxy4YdTPsas>

I2C 5/4 pin connectors: (<http://www.phoenixent.com/>)

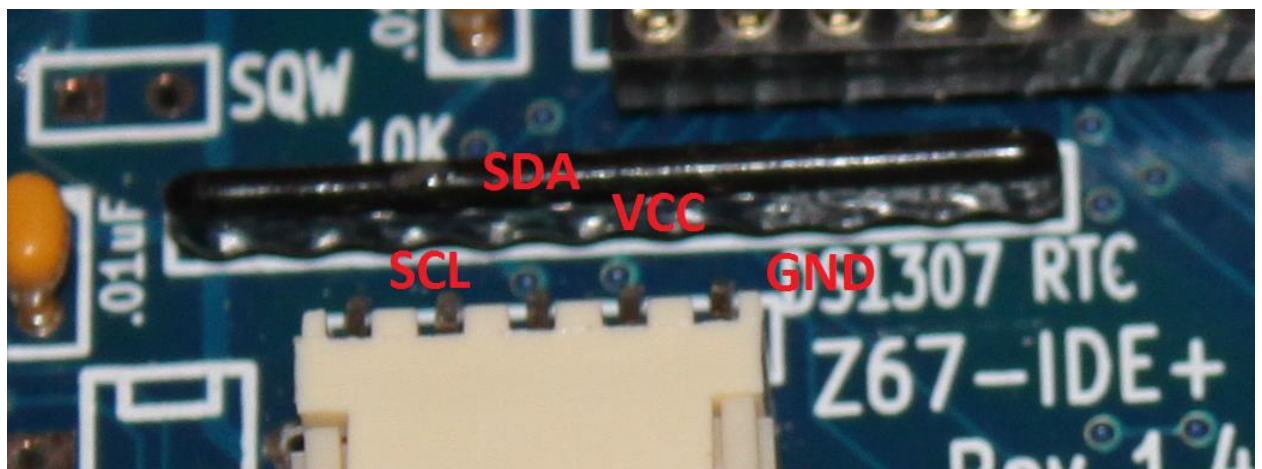
- **HWS15879**
CRIMP TERMINAL HOUSING
5 Position
- **HWS7357**
FRICTION LOCK HEADER
5 Pin Right Angle PCB Mount
- **HWS4374**
CRIMP TERMINAL HOUSING
4 Position
- **HWS15876**
CRIMP TERMINAL-CONTACT
For .100" Spacing Housing
22-28 AWG

Step1:

- Insert 5 pin male connector as shown below. Before soldering the 5 pin male connector ensure that you can still insert the CF cards adapter. Proceed to solder the 5 pin male connector if no issues.

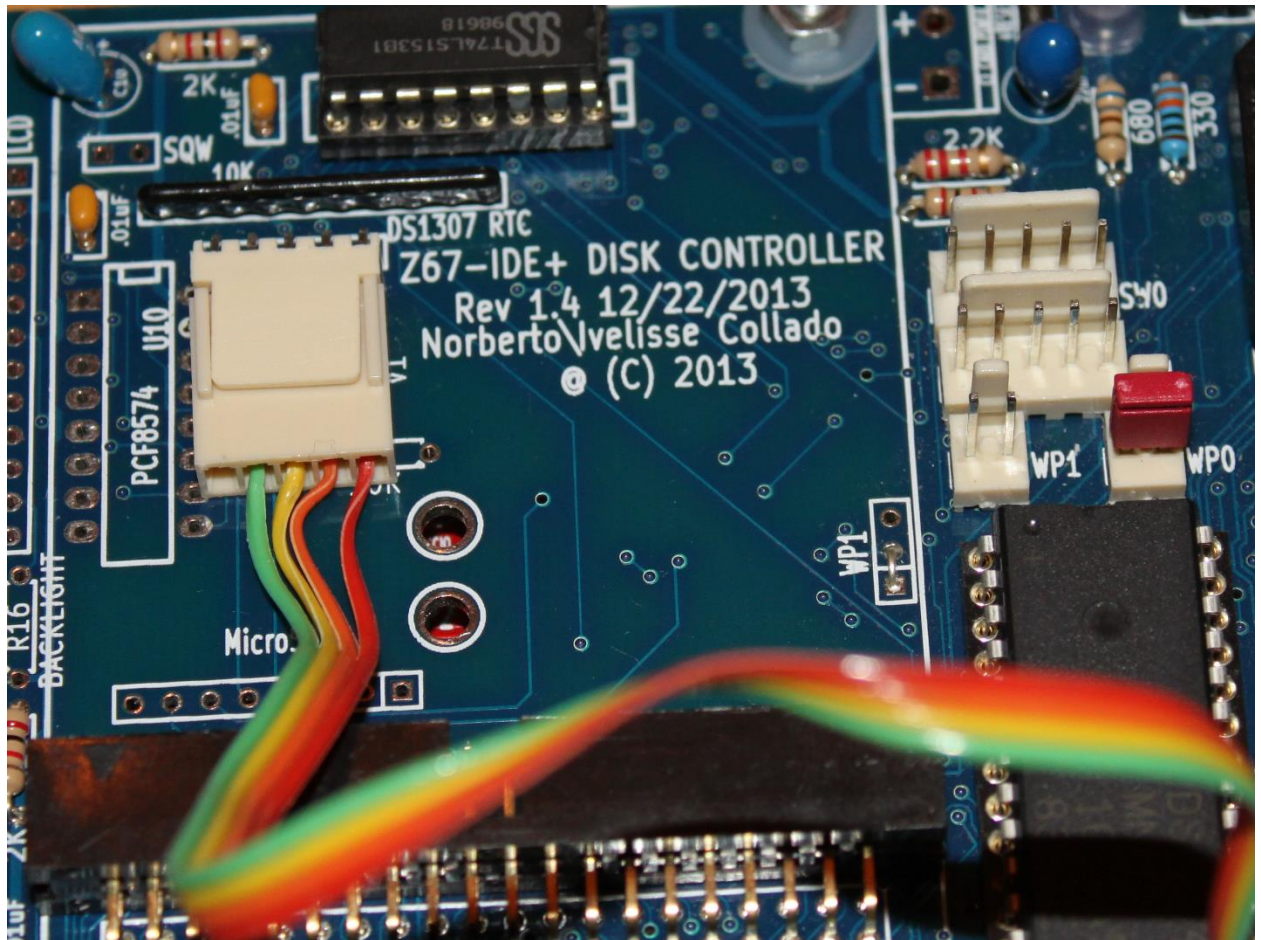


- The 5 pin connector signals are defined as follows:
 - Pin 1 = GND
 - Pin 2 = VCC
 - Pin 3 = SDA
 - Pin 4 = SCL
 - Pin 5 = SQW (not use at this time)



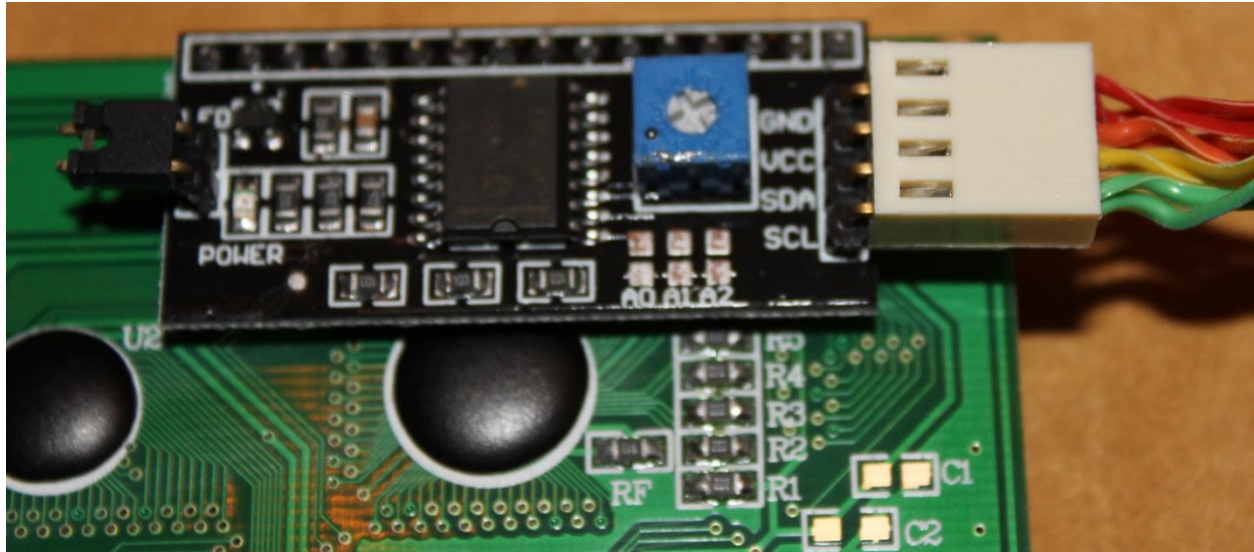
Step 2:

- Insert 5 pin female connector as shown. In this case the Red cable (pin1) is GND. Orange cable is VCC. Yellow cable is SDA. Green cable is SCL.



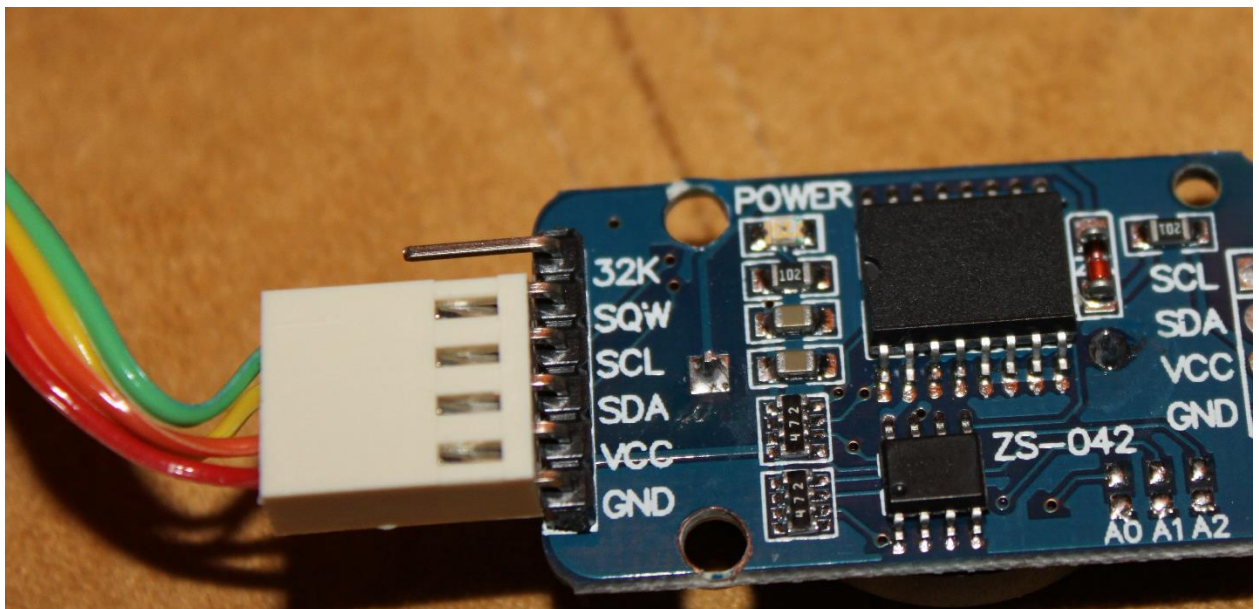
Step 3:

- Connect cable to LCD I2C pins. I'm using a 4 pin female connector. Red cable is GND.



Step 4:

- Connect same cable connector to the RTC/EPROM module. Red cable is GND.



LCD Display (20x4)



Description:

- LCD Display Line 1 - is used to display the FW level.
- LCD Display Line 2 – is used to display the VD number and the status of the write protect switches for each CF card. If the write protect switch is enable it will display “WP” for Write Protected. If the write protect switch is off, then it will not display the “WP” message as shown above.
 - o VD: The VD (Virtual Disk) number is controlled by two pushbutton switches. Each switch will increment each digit independently from 0 to 9. All VD’s values are saved in the RTC EEPROM circuitry so that last known position is display on power-on or reset.
- LCD Display Line 3 – is used to display time and day information. The clock by default is configured to use a 24-hour format.
- LCD Display Line 4 – is used to display how many CF cards were found. Also the RTC IC contains a temperature sensor in deg C, so the value is display as read.
 - o The Z67-IDE+ controller only detects the amount of CF cards during reset or power-on. If for some reason the CF’s are not detected, it will jump into the error routine by displaying on the LCD the corresponding error message and at the same time it will blink the IDE and the LCD backlight LED’s.

LCD Display Scan

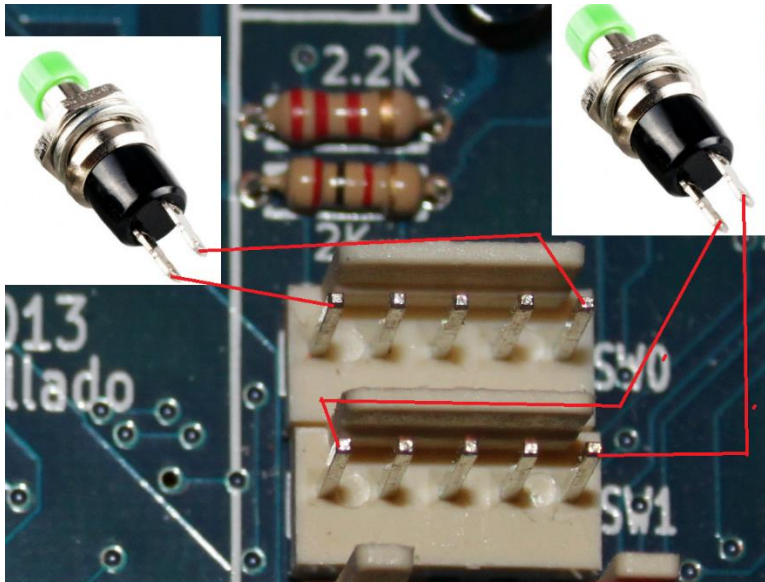
- The LCD display will only update when there are “**no**” SASI commands in flight. If there is an interrupt from the H8/H89, the LCD will not be updated until “**all**” SASI commands are completed. This is done to avoid slowing down the performance of the SASI bus as the I2C interface is a slow bus. When this is happening the display for the time on the LCD will stop to update.
- The LCD display will be updated every 400ms if no SASI activity is present.
- Always change the VD number before booting the H8 or H89. No need to reset the system is the VD number is change before booting into the system.
- Write Protect switches can be enabled/disabled at any time; before booting into the OS or afterwards.

EEPROM

- Only the first four bytes are used to store the VD number information and associated control variables as well (0x00 – 0x03).

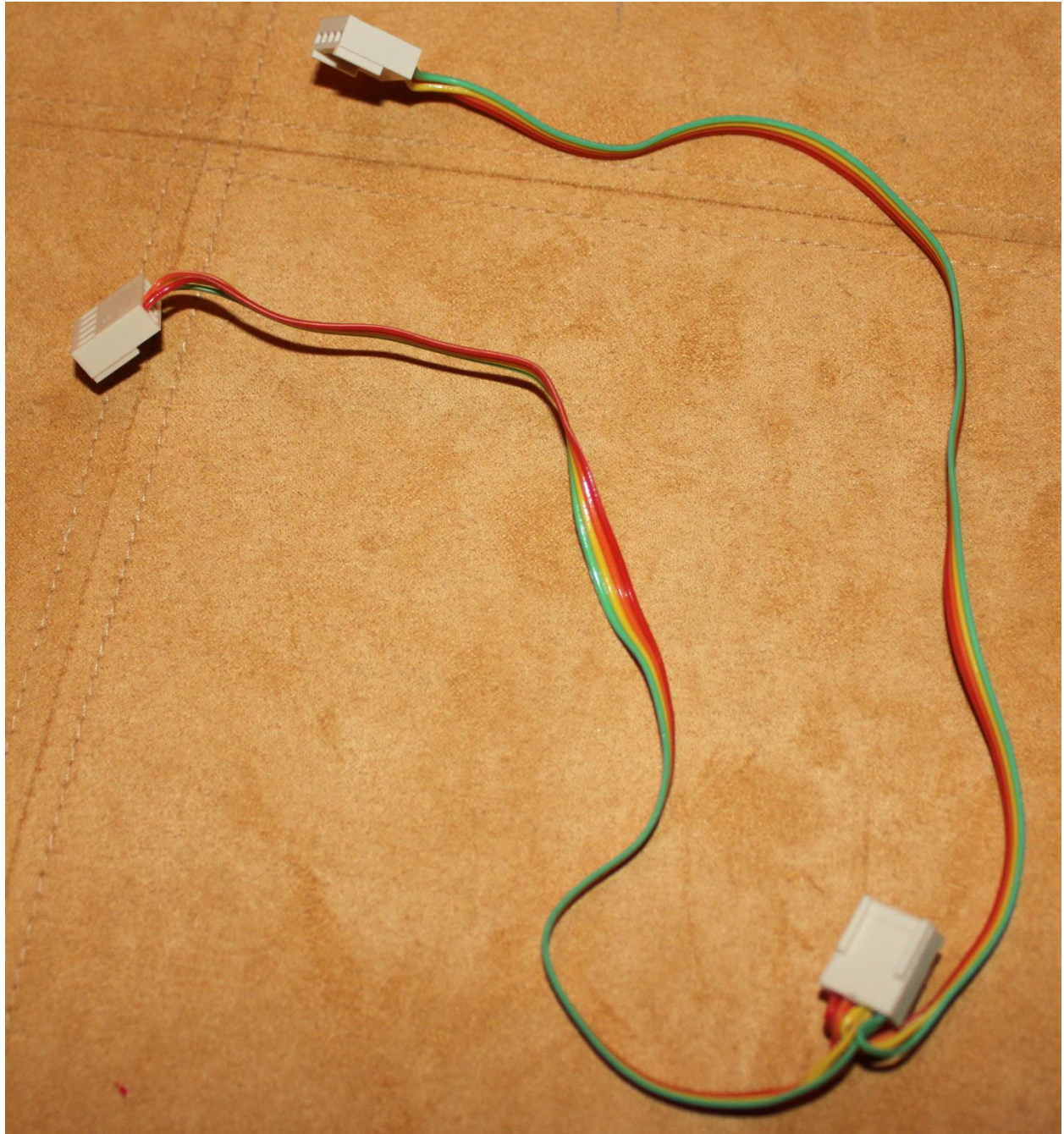
Pushbutton

- Connect the pushbuttons as shown below to control the VD #'s. Solder a 0.01uf cap across each pushbutton switch pins (cap not shown below).



I2C Cable

- This cable can be of any length. Make sure that cable is inserted properly to avoid burning out the LCD/RTC modules.



I2C FW

- The FW to support I2C is labeled as 1.4M version. It can be obtain at the following link:
http://koyado.com/Heathkit/Z67-IDE-plus_files/Z67-IDE%20LCD%20RTC.zip

Serial Port Main Menu

- By connecting the Z67-IDE+ serial port to the PC and by using the MTK2 utility the user will be able to manage the RTC date/day/time as needed. Also can managed the VD#'s and other functions as well.

```
Initializing LCD...  
LCD Initialized...
```

```
Z67-IDE+ SASI/SCSI HARD DRIVE CONTROLLER  
Author: Norberto Collado - (C) Copyright, 2010-2016  
Email: norberto.collado@koyado.com  
Released Version: V1.4M  
Date: 12/01/2015 - 11:08PM  
Source file: Z67-IDE_V_1_4M_FW_SCSI_PLCC.ASM - HEX FILE: Z67-  
IDE_V_1_4M_FW_SCSI_PLCC.HEX  
HW/Settings:  
MicroController: DS89C430/450-MNL @33MHz  
Baud Rate: 14,400 8-N-1, FLOW CONTROL: NONE  
IDE Controller: CS82C55AZ (8MHz)  
SCSI Controller: Z53C8003VSC  
SCSI Data Transfer: Asynchronous -> PSEUDO-DMA MODE  
SCSI Parity: Enabled -> ODD  
I2C Support: I2C LCD and RTC support  
Drive Select: (0-99) One hundred bootable drives with a 16GB CF card  
supported  
Replication: Boot System 0 is copied to all boot Systems n+1 via the  
serial port menu  
BCD switch position determines replication position  
Imaging: Image Drive X to Drive Y supported via the serial port menu  
Write Protect: Master/Slave IDE Hard Drives Write Protection  
supported  
Compiler: MCS-51 Family Macro Assembler A S E M - 5 1 V 1.3  
=====
```

Website: <http://plit.de/ase-51/>
Total RAM: 1K BYTES

Please wait... Initializing IDE Interface...

Detected SD/DD jumper OFF. Scanning for Master and Slave IDE Drive.

Please wait... Scanning IDE Interface for IDE Hard Drive (0).
Model: TS8GCF133
S/N: 617209561270E9000241
Rev: 20120327
Cylinders: 15538, Heads: 16, Sectors: 63

Please wait... Scanning IDE Interface for IDE Hard Drive (1).
Model: TS8GCF133
S/N: 617209561263AD001464
Rev: 20120327
Cylinders: 15538, Heads: 16, Sectors: 63

Z67-IDE Menu disabled. Use the ESC key to enable Z67-IDE Menu.

Target ID: 1 Z67-IDE+ DISK CONTROLLER
Product revision level: V 1.0 - 10/31/2016

Saturday, 12/05/2015
17:22:40

Switch Selection: #00 position.

Virtual Disk #00 mounted.

Hard Drive 0 is not write protected

Hard Drive 1 is write protected

Z67-IDE Controller Ready to transfer data to/from IDE Drive 0 or Drive

Note: Press the "ESC" key on your keyboard to enabled the Menu as shown below.

Z67-IDE Manager Menu
=====

- a. Replicate Drive 0
- b. Replicate Drive 1
- c. Image Drive 0 to Drive 1
- d. Image Drive 1 to Drive 0
- e. Display Drive Selection
- f. Display Write Protect Switch Status
- g. Test IDE Buffer RAM - 512 bytes
- h. Display Drive 0 HDOS Partition
- i. Display Drive 0 CP/M Partition
- j. Display Drive 1 CP/M Partition
- k. Pinout Wiring Test Utility
- l. Replicate by Partition from Drive 0 to Drive 1
- M. Read RTC Time/Date/Month
- N. Set RTC-(ZS-042)
- O. Init/Test LCD (20x4 WITH I2C CONTROLLER)
- P. LCD System Scan
- Q. Write VD# to EEPROM
- R. Read VD# from EEPROM

S. Scan I2C bus
T. Load Default Power-on Message into LCD Display
z. Exit

Please enter a Command: s

I2C SLAVE ADDRESS ASSIGMENTS: LCD=0X4E, RTC=0XD0, EEPROM=0XAE

Value = D0H

Value = AEH

Value = 4EH

Please enter a Command: r

Value = 00H

Value = 00H

VD#: 00

Please enter a Command: m

Saturday, 12/05/2015

17:23:31

Please enter a Command: z

Z67-IDE Menu disabled. Use the ESC key to enable Z67-IDE Menu.