

Legatus[®]
Volume Unit Meter with
PIC16F887A Microcontroller

Augustica[®]
T e c h n o l o g i e s

www.augustica.com

DANGER

Safe assembly and operation of this kit is the users responsibility. The kit and this user manual are provided 'as is'. Augustica Technologies Inc. accepts no responsibility for any damage, injury or death as a result of assembling this kit or using the information herein. The assembled kit must be properly enclosed to prevent contact with voltages and must be kept out of reach of children. Keep this kit away from water and other damp environs. As with any self-assembled electronics project improper assembly could cause damage to the kit, overloading of a circuit or an electrical fire. If you don't feel comfortable in assembling the kit or using the VU meter, please contact us to return it for a full refund.

INTRODUCTION

The volume meter kit Legatus[®] allows building a two-channel volume unit meter based on PIC16F887A microcontroller. Legatus[®] requires about 20 mVolt in amplitude of a signal to activate each of the 16 segments of liquid crystal display ("LCD") indicator HD44780 used to graphically present volume of the signal. Activation of all 16 segments of the LCD HD44780 ("a full scale deflection") requires a signal with amplitude of about 320 mVolt.

ASSEMBLY

Cleanliness is essential. Before soldering, be sure to clean both sides the PCB with 70% to 90% isopropyl alcohol. Do not use dull looking solder. Solder should shine. If it does not shine, first clean away the outer oxidation with some steel wool or a copper-scouring pad. If the resistor leads look in the least gray, clean away the oxidation with either steel wool or a wire sniper's sharp edges. Admittedly, with new resistors and a fresh PCB, such metal dulling is rare, but if the parts have sat in your closet for a year or two, then expect a good amount of oxidation to have developed.

Be consistent in orienting the resistors, capacitors and diodes. Keep nominal information on a resistor's or capacitor's body flowing from the left side to the right side as you face the resistor or the capacitor straight on. This will pay dividends later, if you need to locate and de-solder a resistor, a capacitor, or a diode placed in a wrong location. Because the board is double sided, with traces and pads on each side, it is easier to solder the resistors and diodes from their topside. As the PCB is overbuilt, it is difficult to remove an incorrectly placed part. Be sure to confirm all the diodes' orientations as well as the orientation of the microcontroller PIC16F887 and operational amplifier LM358. Confirm trice, solder once.

Start with installation of 16-pin female header connecting Legatus[®] PCB and HD44780 PCB. The female pin header is installed **on the backside** of the Legatus[®] PCB. This female pin header is the only part that is installed on the backside of the Legatus[®] PCB. Make sure that the female pin header is positioned perpendicular to the back side of the PCB and then solder only pin 1 and pin 16 of the female header. Now, verify that the female pin header is still positioned perpendicular to the backside of the Legatus[®] PCB and make necessary adjustments, if required, and then solder the remaining pins to the PCB.

Second, solder 16-pin male header to **backside** of LCD HD44780 PCB. Make sure that the male pin header is positioned perpendicular to the backside of the LCD HD44780 PCB and then solder only pin 1 and pin 16 of the male header. Verify that the male pin header is still positioned perpendicular to the back side of the LCD HD44780 PCB and make necessary adjustments, if required, and then solder the remaining pins to the PCB.

Third, assemble the components that have the lowest profile - resistors, diodes, and capacitors. Begin, with installation of resistors R1 and R2, R3 and R4, R5 and R6. Pay attention to the values of these resistors as they are responsible for the proper operation of the operational amplifier IC1 LM358. Continue with installation of the remaining resistors R7, R8, R9, R11 and R12.

Fourth, solder capacitors C2 and C3. These two capacitors have capacitance of 33 pF. Make sure that you install right capacitors because they are responsible for the proper operation of the crystal X1. Without proper operation of the crystal X1 the microcontroller PIC16F887 will not operate. So, check twice that C2 and C3 have the value of 33 pF before you solder them to the PCB. Now, solder the remaining capacitors C1, C4 and C5 that each have value of 1 uF.

Fifth, solder the crystal X1 followed by diodes D1 and D2. Pay attention to the polarity of the diodes D1 and D2.

Sixth, solder 40-pin socket of the microcontroller IC2 PIC16F887. Pay attention to the polarity 40-pin socket and align the socket's notch with the socket's notch depicted on the PCB. Now, solder 8-pin socket of the operational amplifier IC1 LM358. Pay attention to the polarity 8-pin socket and align the socket's notch with the socket's notch depicted on the PCB.

Seventh, solder trimmer resistor R10.

Eighth, solder four-prong terminal block K1.

Ninth, solder push button B1.

Tenth, insert microcontroller PIC16F887 in its socket. Watch for a notch on the microcontroller's body. The notch on the microcontroller has to correspond with the

notch on its socket. Insert operational amplifier LM358 in its socket. Watch for a notch on the amplifier's body. The notch on the amplifier has to correspond with the notch on its socket.

TESTING

Connect +5 VDC, ground, signal from right channel, and signal from left channel to the terminal block K1. Push button B1 allows changing between eight bar modes of the VU meter Legatus[®]. If you made no mistakes during assembly and once voltages are applied to the terminal block K1, Legatus[®] will exhibit a welcome message to let you know that software and hardware operate properly.

LET US KNOW WHAT YOU THINK

If you would like to see some new audio PCB or kit or recommend a change to an existing product, drop us a line by e-mail on the website www.Augustica.com (begin the subject line with "Legatus" or the spam filters are sure to eat your message).