Overview:

One mode of operation available in the ICON Interface Module is the Lookup Table control mode. In Lookup Table mode the ICON Interface Module reads the analog input at the ANALOG_IN pin. The analog value (0-1023 returned for voltages from 0V-4.096V) is used as the address in a lookup table stored in the program memory of the PIC16F873. The default values in the lookup table range from 0-1023. But these values may be modified so that the ICON Interface Module will work with any voltage input as long as it is within the range of 0V-4.096V.

Imagine that you have an analog output that ranges from 1V to 4V and you wish to interface it to the ICON Interface Module. Furthermore, you would like to simulate some gears when the motor is moving forward, and you need to be able to move the motor at half speed when in reverse. You could design an analog circuit that conditions the analog output voltage to meet your needs, and then use the Bi-Directional Analog control mode in the ICON Interface Module. Or you could modify the lookup table in the ICON Interface Module and use your analog control voltage as is.

Using Microsoft Excel, or some other spreadsheet program, you can quickly generate a comma delimited text file (*.csv) and upload the new values from your PC to the ICON Interface Module. You may write your own software application to do this or use the ICON Interface Module Software (available at www.solutions-cubed.com) that has this functionality built in.

Lookup Table Format:

If you are writing your own application you should base your application on the ICON Interface Module communication protocol, specifically the Lookup Write Command (see the ICON Interface Module datasheet).

When using the ICON Interface Module Software the following data format for the comma-delimited file must be adhered to. The table must have the header [Interface Module Lookup Table]. There must be 1024 pieces of data related to the analog voltage measurement (from 0 to 1023 in sequential order). Following this piece of data will be a comma, and the PWM value associated with the analog measurement. The PWM value must range from –1023 to +1023 with the sign dictating motor direction (minus being reverse). All numbers should be in decimal integer format.

[Interface Module Lookup Table]		
0	,	0
1	,	1
….	…	…
1022	,	1022
1023	,	1023

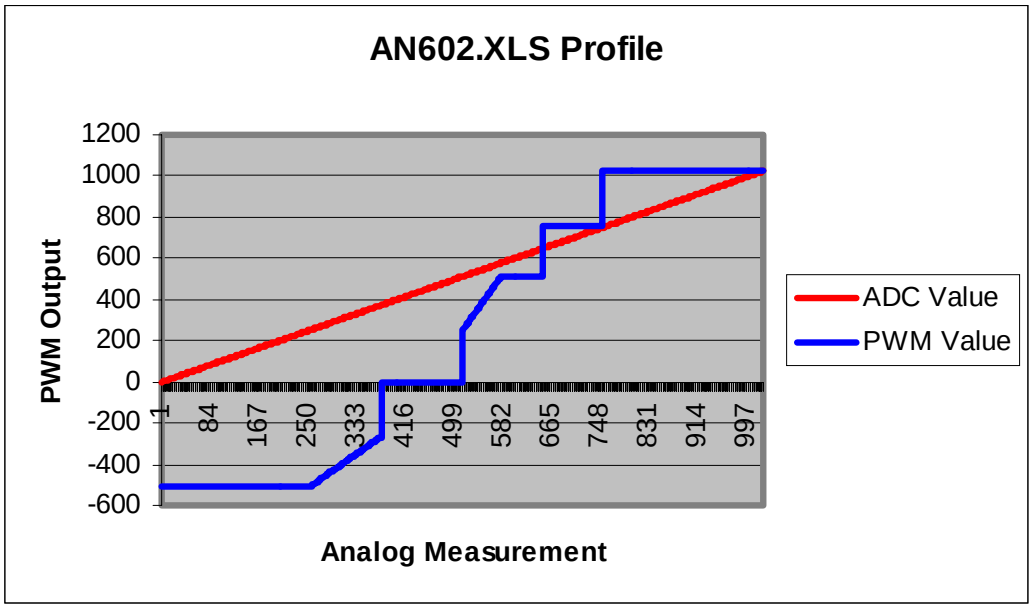
You could generate an entire text file and save it with a *.csv extension. This would look something like…

[Interface Module Lookup Table]
0,0
1,1
2,2
… all the way to
1023,1023

But this method would take more work than is necessary. Most people have access to an office spreadsheet program like Microsoft's Excel. We have included AN602.XLS as an example of an Excel spreadsheet. Using AN602.XLS you can copy, paste, insert formulas, fill-down, and graph the proposed lookup table. You may then save the file as a comma-delimited (*.CSV) file under the "Save As" window.

For our application AN602.XLS can be graphed to display the PWM vs. voltage profile.

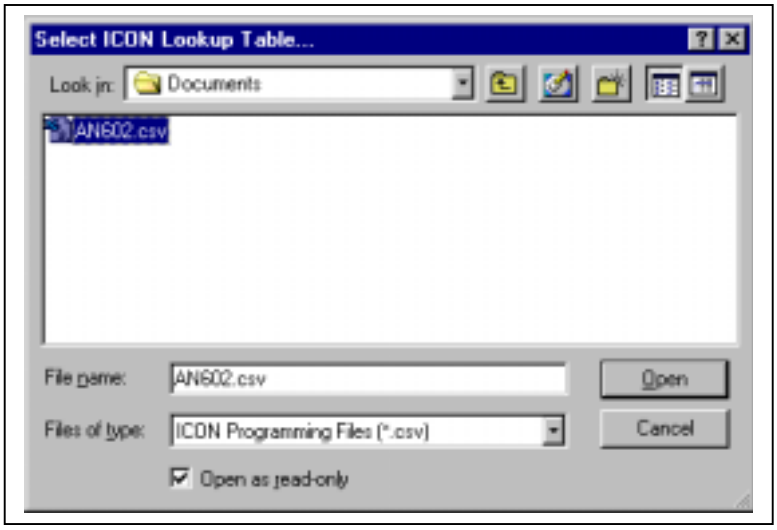
Figure 1: AN602.XLS Chart



In Lookup Table control mode the PWM Step register is ignored, and the Dead Band should be set to 0. To upload the comma-delimited file to the ICON Interface Module you must first save the spreadsheet as a *.CSV file. For this example we'll use AN602.CSV.

To upload AN602.CSV to the ICON Interface Module first run the ICON Interface Module Software then select the "Interface Module" pull-down menu. From the "Interface Module" menu select "Lookup Table Control". You can select "yes" or "no" when queried about downloading the existing lookup table information. From the "Interface Module Lookup Control" window select the "Table Operations" pull-down menu, and then select the "Import Lookup Table from File" command. You may then select the comma-delimited file that you want to import into the software application.

Figure 2: Selecting AN602.CSV

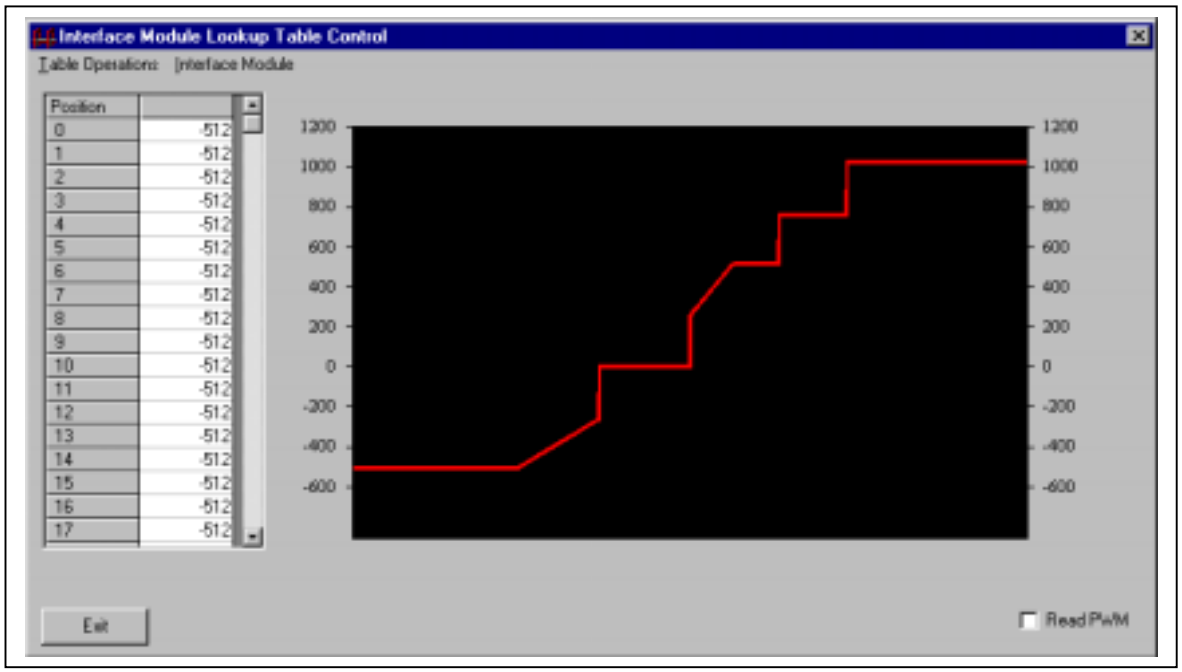


Again from the “Table Operations” pull-down menu, select the “Upload Lookup Table to Interface Module” command. This will load the new table into the ICON Interface Module.

When a lookup table is being uploaded to the Icon Interface Module the ICON H-Bridge control lines will be disabled. You may hear this if your motor is running while the table is being uploaded to the ICON Interface Module.

To test the new lookup table values you must place the ICON Interface Module into Lookup Table control mode. This can be done within the ICON Interface Module Software, or by setting the IM_FUNCTION,AD_LOOKUP bit with application specific software other than that provided by Solutions Cubed.

Figure 3: Interface Module Lookup Control Window



The Lookup Table control mode can be used to interface the ICON Interface Module to a wide variety of analog control voltages. This useful control mode can eliminate or minimize additional analog conditioning circuitry that might otherwise be needed to match control signals to the 0V-4.096V range supported by the ICON Interface Module.

Lookup table values are stored in non-volatile memory and will remain intact after power is cycled off then on. The Look-Up Restore Command can be used to restore the default lookup table to the ICON Interface Module.

Hardware:

In order to upload a custom lookup table to the ICON Interface Module using the ICON Interface Module Software a RS232 to TTL level translator IC must be used. The simplest method to do this is by purchasing the ICON Adapter board. The ICON Adapter board provides lots of connectivity and testing options for use with the ICON Interface Module. A serial RS232 to TTL translator IC is available on the ICON Adapter Board.

It is also possible to connect an inexpensive MAXIM MAX232 IC to the ICON Interface Module to perform RS232 level translation. Both forms of connectivity are described in the ICON Interface Module datasheet available at the www.solutions-cubed.com web site.