When Execute runs, it is as if you typed a command in the command line. Local variables in macros and functions are not accessible. The example in **Calling an External Operation From a User-Defined Function** on page IV-202 shows how to use the sprintf operation to solve this problem.

Using a Macro From a User-Defined Function

A macro can not be called directly from a user function. To do so, we must use Execute. This is a trivial example for which we would normally not resort to Execute but which clearly illustrates the technique.

```
Function Example()
   Make wave0=enoise(1)
   Variable/G V_avg              // Create a global
   Execute "MyMacro(\"wave0\")"  // Invokes MyMacro("wave0")
   return V_avg
End

Macro MyMacro(wv)
   String wv
   WaveStats $wv     // Sets global V_avg and 9 other local vars
End
```

Execute does not supply good error messages. If the macro generates an error, you may get a cryptic message. Therefore, debug the macro *before* you call it with the Execute operation.

Calling an External Operation From a User-Defined Function

Prior to Igor Pro 5, external operations could not be called directly from user-defined functions and had to be called via Execute. Now it is possible to write an external operation so that it can be called directly. However, very old XOPs that have not been updated still need to be called through Execute. This example shows how to do it.

If you attempt to directly use an external operation which does not support it, Igor displays an error dialog telling you to use Execute for that operation.

The external operation in this case is VDTWrite which sends text to the serial port. It is implemented by the VDT XOP (no longer shipped as of Igor7).

```
Function SetupVoltmeter(range)
   Variable range    // .1, .2, .5, 1, 2, 5 or 10 volts

   String voltmeterCmd
   sprintf voltmeterCmd, "DVM volts=%g", range
   String vdtCmd
   sprintf vdtCmd "VDTWrite \"%s\"\r\n", voltmeterCmd
   Execute vdtCmd
End
```

In this case, we are sending the command to a voltmeter that expects something like:

```
DVM volts=.2<CR><LF>
```

to set the voltmeter to the 0.2 volt range.

The parameter that we send to the Execute operation is:

```
VDTWrite "DVM volts=.2\r\n"
```

The backslashes used in the second sprintf call insert two quotation marks, a carriage return, and a linefeed in the command about to be executed.

A newer VDT2 XOP exists which includes external operations that *can* be directly called from user-functions. Thus, new programming should use the VDT2 XOP and will not need to use Execute.