## Introduction

This document provides background information and troubleshooting steps to help resolve Ethernet communication problems with the MP160. The flow chart on page 6 is designed to help identify specific factors preventing communication.

MP160 communication can be compromised by a variety of factors. Typically, the symptom is the presentation of dialogs (such as the examples below) during software startup:
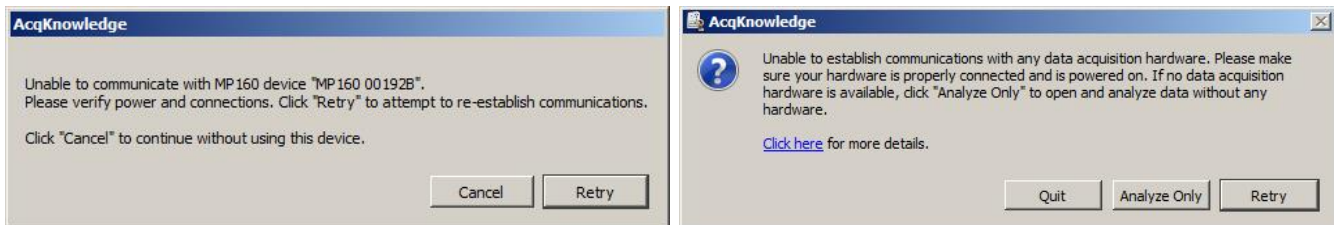
If communication is lost, the following message may appear:
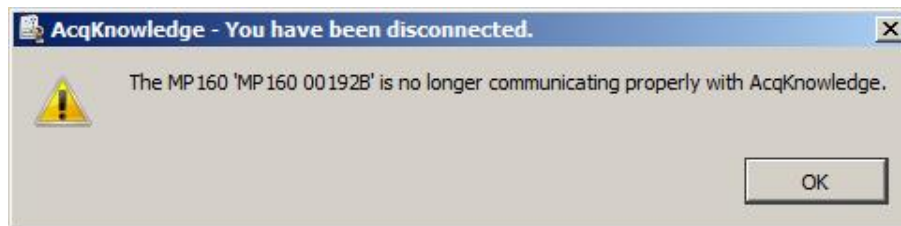
If MP160 communication is absent and none of the above dialogs are displayed, check the "Start" button status in the Acq*Knowledge* software. During normal operation, the button should be green. If grayed out (see right), then the problem is most likely an Acq*Knowledge* configuration issue.
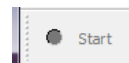
Note the "Do not ask again at startup" checkbox in the above left "Choose MP160" image. Checking this box sets a preference instructing the software not to look for hardware. To restore communication, this default selection must be disabled in the Acq*Knowledge* software "Preferences."

Acq*Knowledge* "Preferences" are accessible via the "Display" menu (in some Mac OS X versions, "Preferences" is under the "Acq*Knowledge*" menu).

Under "Display" > "Preferences" > "Hardware", note the following checkbox:
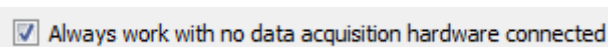
Make certain that this box is NOT checked. If so, uncheck it and re-start Acq*Knowledge*.

In some versions of Acq*Knowledge*, it's possible to disable all hardware types individually. If this has been done, the software will report that it is unable to establish communication, as in the image at the top right on this page. To test for this possibility, click "Analyze Only" and then create a new experiment via the Startup Wizard:
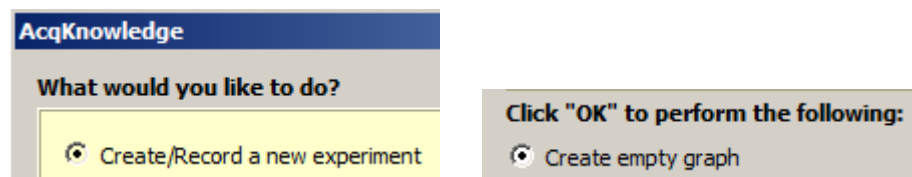
From the graph window, choose "Display > Preferences", and click the "Hardware" pane. Click the "Data Acquisition Device Priority" button. Right-click the "MP160" entry and very that the hint text shows up as "Disable":

If instead, it says "Enable", left-click to enable MP160 communication, click "OK" to close the window, and then exit Acq*Knowledge*. Re-start the software to verify communication has been restored.

Hardware

Power Supply

The MP160 must be functional, properly powered, and connected with the correct type of cable. On the front of the device there are three status lights labeled "POWER", "ACTIVITY", and "BUSY". When the device is on, the power light should be a steady green. A flashing POWER light indicates a problem with the device or its power supply. The power supply should provide 12 volts and at least 1.25 amps (newer units have a supply rated at 4.17 amps). As indicated on the back of the MP160, the tip of the supply's connector should be positive. BIOPAC cannot guarantee proper operation of the MP160 if driven by a third-party power supply not specifically intended for MP160 use. If there is any doubt as to whether the correct supply is being used, the supply should be disconnected until determined suitable for MP160 use. If the power supply is appropriate for an MP160, make certain that the cable connecting the supply to the MP160 is fully inserted. Verify also that the power cord is fully plugged into a functioning electrical supply outlet.

MP160 Status Lights

Fuse

If the power light does not illuminate when the unit is powered on, and power switch/power supply/connections have been verified, the next step is to check the fuse. On the MP160 rear panel (below the power button) is a gray fuse holder (see photos below). With a small slotted screwdriver, push in on the fuse holder and turn counter-clockwise one quarter of a rotation. This will disengage the fuse holder causing a spring to push it part way out. Pull the fuse holder the rest of the way out and then remove the fuse. There is a fine wire running down the center of the fuse. If that wire is visibly broken, or if an ohmmeter connected to the two end caps of the fuse indicates a high (typically "overload") resistance, then the fuse should be replaced.

Location of fuse holder, back of MP160	*Removed fuse holder* *Fuse removed from holder*	*Testing fuse with digital multimeter*

If the fuse is not burned out but the power light still doesn't illuminate, then the unit must be returned to BIOPAC Systems, Inc. for inspection/repair. Please contact BIOPAC Support for an RMA #.

If the power light is steady and green, next check the remaining two status lights. When the unit is powered on, the Activity and Busy lights should both illuminate for a brief period, then the Busy light should extinguish and remain off. The Activity light should flash intermittently. When the device does not detect any connection to network or host computer, it signals by occasionally double-flashing the Activity light.In this state, the Activity light flashes twice, pauses for a couple of seconds and repeats indefinitely.

Check the MP Systems Hardware Guide (available via the "Help" menu in Acq*Knowledge*) for a full explanation of other MP160 status light patterns. Most unusual flashing patterns indicate a problem that will require the MP160 to be serviced. In that case, contact BIOPAC Support for an RMA #, but first try cycling the power button off and on. It is possible the switch is not fully engaged, and this may lead to unusual behavior. If a persistent LED pattern indicates a network problem, continue reading this troubleshooting guide.

Ethernet Cable vs. Crossover Cable

Unlike previous MP150 version hardware, which required use of a Crossover cable for a direct "peer-to-peer" connection, the MP160 is "autoswitching" and can communicate reliably with either an Ethernet cable or Crossover cable. If cable connection issues are suspected, try using a different cable.

Software

Network Card Driver

MP160 systems ship with Tripp▪Lite Ethernet-to-USB adapters. The Windows drivers for this device can be downloaded here. Please contact BIOPAC Support if you have difficulty finding the correct driver.

An incompatible network card device driver can be the cause of some communication problems. This can be checked in the Windows > Device Manager:

1. Start > Control Panel > Device Manager > Network Adapters.

2. Click the Network Adapters "+" button and locate the connection corresponding to the adapter connected to the MP160.

3. If this is the only network adapter on the host computer, disconnect the MP160 and connect the computer to the network (via a patch cable).

4. Once there is a working network connection, right click the adapter that will be used for MP160 communication and select "Update Driver Software." Allow Windows to search the web for an updated adapter driver. If a driver is located, allow Windows to install it.

For issues with communication between Macintosh computers and an MP160 connected via ETHUSB, please see:

http://www.biopac.com/wp-content/uploads/app280.pdf

Although rare, it is possible that a specific network card may be incompatible with the MP160 such as not to allow the card to respond quickly enough to Acq*Knowledge*'s requests for data during acquisition. If communication breaks down only during data acquisition, it may be worthwhile to try a different Ethernet port or a different computer to circumvent the incompatibility.

Other Network Connections

If updating the network card driver does not resolve the communication issue, use the Device Manager to disable all network connections aside from the one used for the MP160. This includes any Wi-Fi connections. After making changes such as this, it is a good idea to re-boot the computer and power cycle the MP160 (turn it off and then back on again) before retesting MP160 communication.

Fixed IP Address

Proper communication between host computer and MP160 should occur with the network configured to assign the IP address automatically. Sometimes, however, communication is established more reliably with a fixed IP address.

1. Open the "Network and Sharing Center" control panel and select the "Local Area Network" to which the MP160 is connected. This will produce a Status dialog box such as that on the right.

2. Click the "Properties" pushbutton. It may be helpful to turn off all services aside from TCP/IP version 4 as shown below on following page.

3. With "Internet Protocol Version 4 (TCP/IPv4)" selected, click the "Properties" button for the Local Area Connection Properties dialog box. The Properties for this protocol may be set for the use of a static IP address (see figure below right).

   a. Use IP address169.254.111.111.

   b. Use Subnet mask 255.255.0.0.

   c. Click OK.
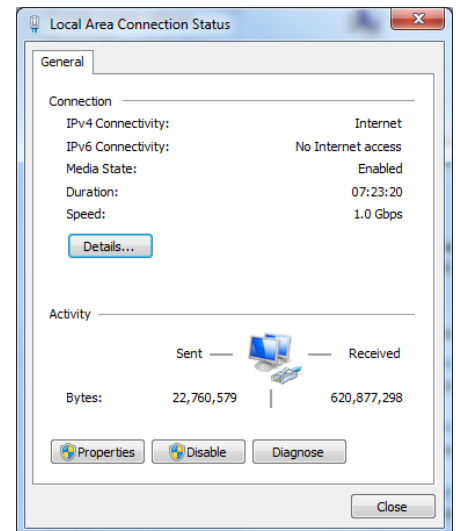
Active Suppression of Communication
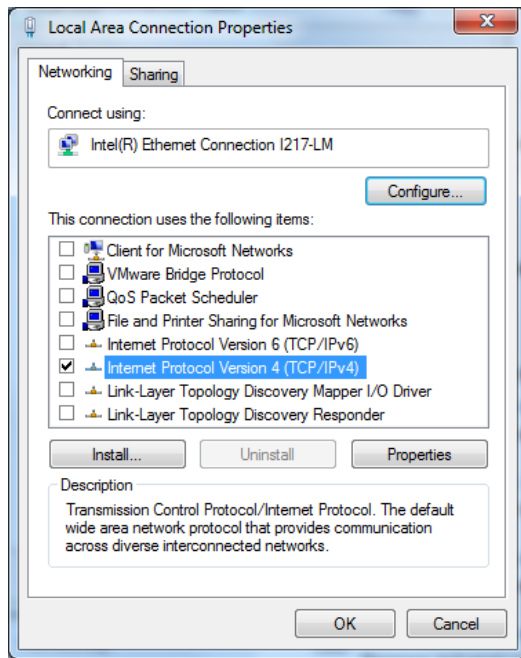
Local Area Connection Properties
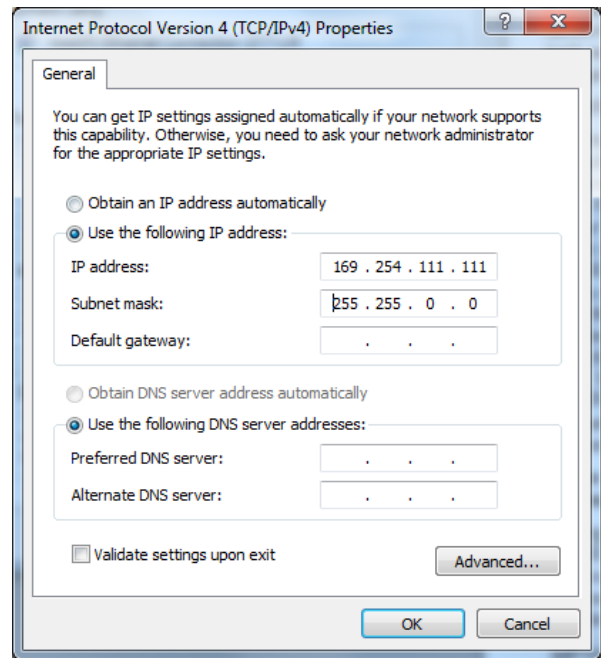
TCP/IP Version 4 Properties

Among the most frequent causes of MP160 communication failures is anti-virus or firewall software that blocks communication. After disabling all network connections aside from the one to the MP160, the computer is safe from assault provided no infected media (flash drive, external hard drive, etc.) are connected. Therefore, all anti-virus and firewall software may be safely disabled. Third party firewalls may be involved. Make sure ALL firewall and ALL anti-virus programs are turned completely off. Then if communication is not established, re-boot the computer, cycle the power on the MP160, and restart Acq*Knowledge*.

If none of these steps resolve communication, the next step is to begin swapping components to ascertain where the problem might lie. If the MP160 status lights behave normally, the problem is likely to be something other than the MP160. Hence the next steps should be to find another ethernet cable and/or another computer to test.

Fine Tuning

The above recommendations are designed to locate the source of the problem. Once the source has been identified, other steps might be taken to allow MP160 communication without disrupting other functions of the system. For instance, if anti-virus or firewall software is the cause of the problem, the interfering program should be configured to allow MP160 communication without being turned off. Acq*Knowledge* uses UDP ports 16004 and 16005 for communication. Anti-malware software should be set up to not block Acq*Knowledge* from using these ports.

If turning off other network connections allows MP160 communication, the network may be reconfigured so that other network adapters can be re-enabled without hindering Acq*Knowledge*. There are three major reasons why additional network connections might prevent MP160 communication. One is the use of global IP addresses by the host network. Another is that the host network may listen for unknown devices and block communication to and from them. The last is that, when given the opportunity, Acq*Knowledge* might try to use one of the other network adapters instead of the one to which the MP160 is physically connected.

Network administrators can help with problems of the first two types. Provide them with the MAC address of the MP160. The first six digits of the MAC address of an MP160 are always 00 90 3D. The last six digits are the same as the last six digits of the device's serial number. The serial number is printed on a sticker on the MP160's left side. If MP160 communication can be established (e.g., with all other network cards disabled), the MAC address can also be determined from within AcqKnowledge. In recent versions of AcqKnowledge, choose "MP160 > MP160 Info..." to find the MAC address.

If the MAC address is provided to network administrators, they should be instructed to make sure that the device is not blocked and assigned an IP address that is in the same subnet as the ethernet card to which it is attached.
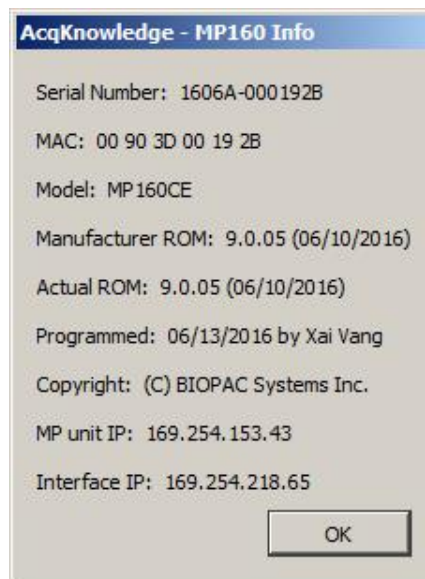
If local network configuration is ruled out as the source of the problem, then adjusting the metrics of the network interface cards may allow for multiple connections without disabling MP160 communication. Here are two methods for modifying the metrics provided that the user **has administrator privileges** on the computer. Both begin by opening the control panel "Network and Sharing Center".

Method 1: [easier but possibly less reliable]

1. Choose the task "Manage Network Connections". Choose "Advanced Settings..." from the "Advanced" menu in the window that opens up.

2. With the "Adapters and Bindings" tab selected in the "Advanced Settings" dialog box, make sure the connection to the MP160 is selected under "Connections".

3. Using the upward-pointing arrow to the right of the Connections selection box, move the MP160 connection to the top of the list.

4. Close all dialog boxes, restart the computer, and test MP160 communications again.

Method 2: [more difficult, but more likely to succeed]

1. Click "View status" at the lower right side of the line containing the connection to the MP160.

2. In the resulting Status dialog box, click "Properties."

3. With the "Networking" tab selected in the Properties dialog box, select "Internet Protocol Version 4 (TCP/IPv4)".

4. Click "Properties." With the "General" tab selected in this Properties dialog box, click "Advanced...".

5. With the "IP Settings" tab selected, uncheck the "Automatic metric" checkbox, and enter "1" (without quotes) in the "Interface metric" edit box. Lower numbers correspond to higher priorities, so with this metric, this network connection should be selected first by the OS when using IPv4.

6. Close all dialog boxes and restart the computer.

MP160 Troubleshooting Flow Chart

Start

MP160 Power LED on steady? — No → Status of MP160 Power LED — flashing → Appropriate Power Supply? — No → Replace power supply

MP160 Power LED on steady? — Yes ↓

Activity and Busy LED status *

Status of MP160 Power LED — Off ↓ Fuse burned out?

Fuse burned out? — No → Contact BIOPAC for RMA for inspection/repair

Fuse burned out? — Yes → Replace fuse

Appropriate Power Supply? — Yes → Contact BIOPAC for RMA for inspection/repair

Activity and Busy LED status * — Malfunction → Appropriate Power Supply?

Appropriate Power Supply? — Yes → Replace power supply

Appropriate Power Supply? — No → Replace power supply

Activity and Busy LED status * — No network detected ↓

Appropriate cable securely connected? — No → Replace/reconnect cable

Appropriate cable securely connected? — Yes ↓

Additional network connections? — Yes → Disable **ALL** other network connections including Wi-Fi → Communication established?

Communication established? — Yes → Consult local IT support for network configuration assistance or Modification of network interface metrics

Communication established? — No → Disable **ALL** anti-virus and/or firewall software

Additional network connections? — No → Disable **ALL** anti-virus and/or firewall software

Disable **ALL** anti-virus and/or firewall software ↓ Communication established?

Communication established? — Yes → Configure AV and/or firewall software to provide exceptions for Acq*Knowledge* and MP160

Communication established? — No → Apply hard IP address to Network Interface Card for MP160: 169.254.111.111

*See MP Systems Hardware Guide available via the "Help" menu in Acq*Knowledge*. The guide contains a table describing the meaning of different LED patterns for the Activity and Busy LEDs. Under normal operation when not acquiring data, Busy LED is off, and Activity LED flashes (amber) at irregular intervals. If Activity LED double flashes at regular intervals, then MP160 does not detect that it is connected to a network.