

Addendum to Owners Manual

V72 & V72TP ETHERNET HOST COMMUNICATIONS MODULES

1 GENERAL INFORMATION

The V72 and the V72TP host communications modules are the primary user interface for use with the BayTech M-Series Data Acquisition and Control (DAC) units. The V72/V72TP allow network users operating on a device using a TCP/IP stack with an Ethernet connection to access various DAC peripheral modules such as 4-port serial I/O modules, A-to-D modules, D-to-A modules, and control relay modules. The V72 host communications module has an Ethernet interface which provides access and control of M-Series DAC peripheral modules via TELNET session or through user software using a direct socket connection.

The V72 is capable of concurrently supporting one connection per installed port. For example, an M16 with a V72 and fifteen V74 4-port serial I/O modules can be operated with a separate connection to each port for a total of 60 simultaneous sessions. The V72 will automatically detect either 10BASE2 (BNC connector) or 10BASE-T (8-pin modular connector) network activity. The V72 supports Ethernet II and Ethernet SNAP frame types automatically, eliminating concern about DLC compatibility. No configuration or jumpers are necessary.

IMPORTANT: You should determine what types of peripheral modules you have installed in your M-Series DAC unit in addition to the V72 host module. You should familiarize yourself with the various operation modes of the installed peripheral modules. A brief operational description of each peripheral module is provided in the *Quick Reference* section of the M-Series Owner's Manual. A more specific operational description is discussed in the relevant section of the owner's manual. For example, the V74 4-port serial I/O module is discussed in *Section 1.2.3*, *Section 1.3.8* and *Section 1.4.5* of the *Quick Reference* section and in *Section 12* through *Section 16* of the owner's manual. The V74 module supports five modes of operation: full duplex mode, immediate message mode, command mode, immediate data mode, and broadcast mode. It is crucial that you review each of these modes of operation to determine which is relevant to your application.

Section 9 of this addendum provides a "Getting Started" section for first-time users.

2 SPECIFICATIONS

PROTOCOLS: IP, ARP, ICMP, TCP, TELNET

NETWORK INTERFACE: Ethernet; IEEE 802.3 compliant, 10BASE2 (thin coax, BNC) and 10BASE-T (twisted pair, RJ-45). Automatic media and frame selection. The V72 has both 10BASE-T and 10BASE2 connectors. The V72TP has a 10BASE-T connector.

FRAME TYPES: Ethernet II & SNAP

SPEEDS: 10 mbps

BUFFER SIZE: 256 KB

PROGRAM MEMORY: Selector erase FLASH memory

SECURITY: Password protected log-on procedure

INDICATORS: Green LED - Link integrity (10BASE-T only),
Red LED - Network activity (RX/TX)

POWER REQUIREMENTS: Supplied by M-Series base unit.
+5 VDC, 300 mA

ENVIRONMENT:

Operating Temperature Range: 0° to 70° C.

Storage Temperature Range: -40° to 80° C.

Humidity: 5 to 95% RH.

3 CABLING

CAUTION: Power should be turned off when cables are being installed.

3.1 10BASE2 (COAX) CONNECTION

The 10BASE2 port of the V72 host module connects to any BNC connector on the network cable. BayTech provides a T-connector for this purpose. The V72TP has a 10BASE-T connector only. Please see the figure below.

3.2 10BASE-T (MODULAR) CONNECTION

If your network uses 10BASE-T, RJ-45 connectors, connect an RJ-45 cable between the RJ-45 port and the network hub. The modular port is defined as DTE (i.e., Pin 1 is TD+, Pin 2 is TD-, Pin 3 is RD+, and Pin 6 is RD-). Most RJ-45 network hubs will require a straight cable type. The *LINK* (link integrity) LED on the back panel and at the connected port on the hub will illuminate if there is a good connection between the V72/V72TP and the hub.

4 OPERATION

4.1 PROGRAMMABLE FEATURES

4.1.1 IP ADDRESS

The IP Address is the network address for the V72 host module. The IP Address consists of four bytes with each byte ranging from 0 to 255 decimal. This parameter must be programmed before the V72 can be accessed on the network. **The factory default IP Address is 0.0.0.0.**

4.1.2 SUBNET MASK

The SUBNET Mask is a bit mask that identifies the network portion of the IP address, allowing the V72 to determine whether to send a packet directly to the client or to a gateway. The Subnet Mask consists of four bytes with each byte ranging from 0 to 255 decimal. This parameter must be programmed before the V72 can be accessed on the network. **The factory default Subnet Mask is 0.0.0.0.**

4.1.3 GATEWAY

The Gateway is the address of a router for connection to other networks. The Gateway address consists of four bytes with each byte ranging from 0 to 255 decimal. **The factory default Gateway address is 0.0.0.0.**

4.1.4 SELECT CODE

The Port Select Code is sent as part of a select sequence by the host terminal to the V72 in order to select specific modules or the main board of the M-Series unit and issue configuration or data commands. The port select code is a programmable ASCII character string that can range from 1 to 8 characters. *Section 10.2* in the Operator's Manual describes how the port select code is used to select a specific module or the main board of an M-Series unit. **The factory default port select code is \$BT.**

4.1.5 PASSWORD

The V72 Password, if enabled, is required of all users who attempt to access the V72. The Password consists of an ASCII character string with a maximum length of 8 characters. **The factory default Password is BTA.**

4.1.6 FORMATTING DATA AND MESSAGES

The user interface is a collection of items that affect the presentation or formatting of data and messages. These items are:

- 1) "ID Msg". This is the message which is sent when the user first connects to the module. It identifies the V72 host and the firmware revision number. This message may be prevented from being displayed by disabling this option. Default is "enabled".
- 2) "Login". The V72 implements an authentication procedure, requiring the user to successfully submit a password before gaining access to the module. Disabling this option eliminates the need for users to log in, granting access upon connection. Default is "enabled".
- 3) "IMR". This option affects immediate mode messages only. In order to optimize data buffer utilization and minimize network data traffic, data buffers are held for up to 100 milliseconds or until full before being sent to the receiving workstation. This allows for packing of data and prevents transmission of an excessive number of packets with small amounts of data. For most applications, this aspect of operation poses no problem. But for some applications, the transmission delay may be undesirable. In the case of 4 port serial modules configured to operate in the immediate message mode (see DAC reference for V74/75 programming), the V72 may be configured to send all messages immediately upon receipt when this option is enabled. Default is "disabled".
- 4) "CRT". Carriage return translation reconciles discrepancies between the TELNET end of line convention and other types. TELNET applications will typically place either a null (0x0) or line feed (0xa) after a carriage return. This may cause unpredictable operation if terminal devices connected to the DAC are expecting only a carriage return. By enabling this option, the V72 will strip off any null or line feed which follows a carriage return prior to sending the data on to its destination. Default is "disabled".

4.2 V72 HOST CONNECTION

The V72 host module requires a physical network connection to perform data acquisition and control functions with the M-Series modules. The V72 supports 10BASE2 or 10BASE-T Ethernet connections with Ethernet II or 802.3 SNAP framing. IP version 4 is required and TCP connections may be established to the TELNET port via A TELNET client or any ephemeral port (port number above 1024). The latter form of connection requires the user to develop workstation code, but allows for automated unit access and disposition of data. Use the following procedure to access the M-Series modules through the V72 host module:

1. Open a session to the V72 module using any workstation TELNET client or ephemeral. You will be presented with a welcome screen (if enabled) and a login prompt (if enabled) upon successful establishment of the session similar to the following:

```
M-Series V72 DAC Host
Unit: 1  Module: 1
F.24, copyright (c) 1995-1997
Bay Technical Associates

To login, enter password.

Login:
```

NOTE: You will not get the welcome message and/or the login prompt if either one of these options are disabled in configuration mode (see *Section 5.7* of this addendum).

2. Enter the password at the login prompt (if enabled).
3. If the login procedure is enabled, you will receive a "Login Successful" message and a prompt to enter a selection if the password is successfully entered. At this point, you may configure modules, connect to ports, receive messages, etc.. See *Section 6* of this addendum for a summary of V72 commands.

Refer to *Section 15.2* of the Operator's Manual for operation information concerning the 4-port serial peripheral communications modules (e.g., V74, V75, V76, etc.). The V72 can route data from a peripheral communications module operating in Immediate Message mode or Immediate Data mode to one and only one network workstation. A network workstation must send a command to the V72 module to receive messages or data. This command consists of the port select code (\$BT - default), capital "I", and *Carriage Return* or *Line Feed*. For example, if using the default port select code, send **\$BTI<cr>** where <cr> is *Carriage Return*. If a workstation issues this command and another workstation is currently receiving immediate mode data, the requesting workstation will receive the message "Immediate Mode in use".

The V72 will send the message "Command/configuration mode in use" to a workstation that attempts to access command mode of a module while another workstation is currently in command mode for that module. The requesting workstation will not be able to place a module into command mode until the other workstation either issues a disconnect command (\$BT<cr>) or makes a connection to a specific peripheral communications port. See *Section 4.6* of this addendum for a summary of the various V72 messages.

4. A host connection to the V72 is terminated by sending the port select code (\$BT - default), capital "X", and *Carriage Return* or Line Feed. For example, if using the default port select code, send **\$BTX<cr>** where <cr> is *Carriage Return*.

NOTE: Some workstation TELNET client packages will not terminate their side of the TCP connection when the server initiates an end to data transmission, resulting in an unwanted half open TCP connection. To avoid this situation, it is best to terminate a TELNET session from the workstation if that capability is provided with the workstation TELNET package.

4.3 REVERSE TELNET OPERATION

The V72 provides a Telnet Client which is available if the M-Series unit has a V71 serial host module or V93 modem host module installed. This service is invoked by connecting a terminal or PC running communications software to the V71 or by dialing into a V93 and entering **\$BTm,p<cr>**, where \$BT is the default port select code (assuming the default port select code is used), m is the module number of the V72, p is the V72 client port number (which must be between 80-95), and <cr> is *Carriage Return*. The V72 will respond with the following message:

V72 Host Telnet Client Service.
Enter target IP address in dotted decimal form:

Enter the IP address of the device to which you wish to connect as a series of four decimal numbers separated by periods. There is no name resolver at this time, so the user must know the IP address of the destination. When the address is correctly entered, press "<cr>". A connection progress report will be displayed similar to the following:
Connecting.....Connected

Dots will be printed to the screen at the rate of 1 per second until the connection is established, at which time the "Connected" message is displayed. Once the connection is established, the target will take control of the session and the user may operate as from any Telnet client. If the host does not respond or refuses the connection, the following message will be displayed:

Cannot connect to host.

If a Telnet connection is terminated for any reason, the following message will be displayed:

Host session terminated.

In both the preceding connection failure and termination cases, the user will be prompted again to enter a target IP address.

To terminate a Reverse Telnet session, the user may log out of the server or issue a disconnect command to the V71 or V93 (i.e., "\$BT<cr>", if using the default port select code). A logout from the server will cause the TCP connection to terminate, but the client session will remain open and the user will be prompted for an IP address. Issuing a V71/V93 disconnect ("<cr>") will cause the client to issue a disconnect from the server but no notice will be provided to the user as the V71/V93 - V72 connection will have been terminated. Subsequent Telnet connections will need to be obtained by opening another client session.

4.4 RESOURCE RELEASE FUNCTION

Circumstances may arise when it may be necessary to terminate a connection remotely without having to reset the unit. For example, this situation will occur if a network user does not terminate a port connection to a V74 port. Connection termination may be accomplished using the Resource Release function. There are 3 specific methods to accomplish a connection release. In addition, a fourth command can be used to reset the unit if necessary. These functions are described below (assuming the default select code of "\$BT" is used):

\$BTRI<cr> Causes the Immediate Receive mode to be released.

\$BTRC<cr> Causes the Command/Configuration mode to be released (except if user is connected to the Service Port).

\$BTRm,p<cr> Causes the module, port as specified by "m,p" to be released.

\$BTRS<cr> Causes the unit to reset after first terminating all open sessions. This may take several minutes, during which time the unit will not be accessible.

5 USER INTERFACE

There are two methods to select a serial I/O port (e.g., V74, V75, etc). You can either send a port selection sequence which consists of an (1) ASCII character string or send (2) the Attention Character five times(**default ;;;;;**) to invoke a port selection menu. See *Section 6* of this document for the ASCII Character String Method for selecting a serial I/O port. See Section 5.1 below for the Menu Mode /Attention Character method for port selection

IMPORTANT: If the ASCII String Method is used to select an I/O port(V74/V75), the ASCII String Method must be used for port disconnection. If the Menu mode or attention character method is used to select the port, the Menu mode or attention character method must be used for port disconnection.

5.1 MENU MODE/ATTENTION CHARACTER METHOD

V72 Ethernet module users can select a serial I/O module port(e.g., V74, V75, etc.) by invoking a port selection menu. The port selection menu is invoked by sending the Attention Character (**default is ;;;;;**) to the V72 host module five times followed by a one second delay. The V72 will respond with a menu similar to the following, if two serial I/O modules are installed in the base unit:

```
M-Series V72-TP DAC Host
Unit: 1 Module: 1
F 0.27e Copyright (c) 1995-1997
Bay Technical Associates
```

To login, enter password. (default is BTA in capital letters)

```
Login:
Login successful.
```

Attention Character: ;

```
Device A (2,1)..... 1
Device B (2,2)..... 2
Device C (2,3)..... 3
Device D (2,4)..... 4
Device A (3,1)..... 5
Device B (3,2)..... 6
Device C (3,3)..... 7
Device D (3,4)..... 8
Immediate Data Collection ..... I
Configure ..... C
Manual Connection ..... M
Unit Reset ..... R
Module Status ..... S
Logout ..... T
```

Enter Request :

The names in the left column are the same as programmed for the Serial I/O Port Device Names and the (m,n) numbers in the middle correspond to the module and port. Type the number corresponding to the desired V72 module to select that port followed by <ENTER>. Type "C" to receive the "Configuration" selection menu (see *Section 5.3*), "X" to Exit, or "T" to logout.

Once a port is selected, you can select another port by sending the Attention character five times followed by a one second delay to invoke the port selection menu. If you type "T" to logout, the V72 will respond with the following:

```
< Your 'TELNET' connection has terminated >
```

5.2 IMMEDIATE DATA COLLECTION

By responding to the *Enter Request:* message at the end of the V72 menu with “I” users can receive immediate mode data. When “Immediate Data Collection” is selected, the user receives messages or data from modules configured to operate in immediate message mode or immediate data mode. Messages are sent automatically to the designated host computer, when it is received by any port on the peripheral communications module. (See Sections 15.1.6.2, 15.1.6.3, 15.2.2 and 15.2.3. in BayTech publication U140E111-02).

5.3 CONFIGURATION

5.3.1 MODULE CONFIGURATION

Configuration changes to the M-Series DAC with a V72 Ethernet module installed can be made through the V72 host module. The configuration changes can be made for all the modules installed in the M-Series DAC, except the V72(See Section 8 for V72 Configuration) or a M03 Memory Module. The V72 will respond with a menu prompting you to enter the desired module number or main board. By responding to “C” to change the configuration of a M3 DAC with a V72 installed in Module 1 and two other modules, you will see a menu similar to the following:

```
Enter Request: C

Configuration
Module 2.....1
Module 3.....2
Main Board.....3
Exit.....X
Enter Request: 1
```

By responding to the *Enter Request:* message at the end of the configuration menu with “1” you receive the configuration menu for Module 2 that looks similar to the following:

```
Enter Request: 1
Copyright(C) Bay Technical Associates 1994-1996
Model V73/74/75/76/50 High Speed Serial 4C-232
Revision F.2.13
Unit: 1, Module: 2

Status.....1
Serial Port Configuration.....2
Port Device Name.....3
Port I.D.....4
Designate Host Port location.....5
Message Terminate Character.....6
Mode of Operation.....7
Time Tag Mode.....8
Connect Port ID Echo .....9
Exit.....X
```

NOTE: For detailed configuration information see the M-Series DAC Owner’s Manual Number U140E111-02(Section 16) or other manuals corresponding to the specific modules installed in your M-Series DAC base unit.

5.3.2 MAIN BOARD CONFIGURATION

By responding to the *Enter Request:* message at the end of the configuration menu with “3” you receive the “*Control Board System Menu*” for M-Series DAC Main Board that looks similar to the following:

```
Enter Request: 3
Control Board System Menu
Bay Technical Associates
Copyright 1994
Revision 0.33 C718
Unit Number 001
```

Set Date.....1
 Set Time.....2
 Set Unit Number.....3
 Program Password.....4
 Exit System Menu.....X

Enter Request:

For detailed Control Board System Menu information see the M-Series DAC Owner’s Manual Number U140E111-02(Section 6).

5.4 MANUAL CONNECTION

The “*Manual Connection*” selection of the V72 menu is used to make a connection to a module other than a Serial I/O module(e.g, V74, V75 etc). By responding to the *Enter Request*: message at the end of the V72 menu with “M” you receive a response similar to the following:

Device A (2,1)..... 1
 Device B (2,2)..... 2
 Device C (2,3)..... 3
 Device D (2,4)..... 4
 Device A (3,1)..... 5
 Device B (3,2)..... 6
 Device C (3,3)..... 7
 Device D (3,4)..... 8
 Immediate Data Collection.. I
 Configure C
Manual Connection M
 Unit Reset R
 Module Status S
 Logout T

Enter Request: M

Enter Module number: 2

Enter Port number (<CR> for none): 3

By entering “2” at the *Enter Module number* and entering “3” at the *Enter Port number*, the user has selected module number 2 and port number 3. Verify the connection by insuring that the red LED of Port 3, Module 2 on the front panel of the M-Series DAC base unit has been selected.

5.5 UNIT RESET

Users can instruct the M-Series DAC with the V72 Ethernet module, to “reset” by using the *Menu Selection Method* to reset the unit. Only a user connected to the host module can issue the reset command. The Unit Reset command does not affect any saved configuration parameters that have been changed from the default values.

Important: The Unit Reset command will terminate communications with connected equipment to the M-Series DAC. You must re-establish communications with the M-Series DAC system after the unit has been reset.

The Unit Reset menu selection is found in the V72 Module Menu. This Menu is invoked by sending the **Attention Character(default ;;;;)** to the V72 host module five times. The V72 will respond with a menu similar to the following, if two Serial I/O modules are installed.

By responding to the *Enter Request:* message at the end of the menu with R(Unit Reset), you will reset the DS-Series unit.

```
Device A (2,1)..... 1
Device B (2,2)..... 2
Device C (2,3)..... 3
Device D (2,4)..... 4
Device A (3,1)..... 5
Device B (3,2)..... 6
Device C (3,3)..... 7
Device D (3,4)..... 8
Immediate Data Collection.. .... I
Configure ..... C
Manual Connection ..... M
Unit Reset ..... R
Module Status ..... S
Logout ..... T
```

Enter Request: R

The M-Series DAC unit has been reset.

5.6 MODULE STATUS

By responding to the *Enter Request:* message in the V72 menu with “S” (Module Status), you can review the current module status. The V72 host module will respond with a menu that is similar to the following:

```
Device A (2,1)..... 1
Device B (2,2)..... 2
Device C (2,3)..... 3
Device D (2,4)..... 4
Device A (3,1)..... 5
Device B (3,2)..... 6
Device C (3,3)..... 7
Device D (3,4)..... 8
Immediate Data Collection ..... I
Configure ..... C
Manual Connection ..... M
Unit Reset ..... R
Module Status ..... S
Logout ..... T
```

Enter Request: S

V72 Status & Diagnostics Menu.

```
System ..... 1
Internal Communications..... 2
Network Interface..... 3
Logged Users ..... 4
Exit ..... X
```

5.6.1 SYSTEM STATUS

By responding to the *Enter Request:* message in the V72 Status & Diagnostics Menu with “1” (System), you can review the current system status. The V72 host module will respond with a menu that is similar to the following:

>1
System Status:
Available local memory (256 byte buffers): 510
System memory (M03 modules, MB): 0
Connections in use: 1
Pending messages (module #s): none
Immediate Mode User: none
Command/Configuration Mode User: none
System up time (days:hh:mm:ss): 2:07:43:54
<Strike any key to continue.>

5.6.2 INTERNAL COMMUNICATIONS

By responding to the *Enter Request*: message in the V72 Status & Diagnostics Menu with “2” (Internal Communications), you can review the current internal communications status. The V72 host module will respond with a menu that is similar to the following:

V72 Status & Diagnostics Menu.

System 1
Internal Communications.... 2
Network Interface..... 3
Logged Users 4
Exit X

> 2

Internal Bus Status:
Internal Bus Errors: 0
Bus transmit data channel: clear
<Strike any key to continue.>

5.6.3 NETWORK INTERFACE

By responding to the *Enter Request*: message in the V72 Status & Diagnostics Menu with “3” (Network Interface), you can review the current Network Interface status. The V72 host module will respond with a menu that is similar to the following:

V72 Status & Diagnostics Menu.

System 1
Internal Communications..... 2
Network Interface..... 3
Logged Users 4
Exit X

> 3

Network Status:
Medium status: good
Medium faults: 0
Xmit bufr errs: 0
Available send buffers: 30
Receive queue status: open

<Strike any key to continue.>

5.6.4 LOGGED USERS

By responding to the *Enter Request:* message in the V72 Status & Diagnostics Menu with “4” (Logged Users), you can review the Logged Users into the system. The V72 host module will respond with a menu that is similar to the following:

V72 Status & Diagnostics Menu.

```
System ..... 1
Internal Communications..... 2
Network Interface..... 3
Logged Users ..... 4
Exit ..... X
>4
```

Active Users:

Address/Port	Internal TX/RX	Net Data Flo	TX/RX	Bus Data Flo	TX/RX
1) *200.4.3.10	none/none	ok/ok	no/ok		
2) 200.4.3.10	2,3/2,3	ok/ok	ok/ok		

The star (*) indicates that Active User #1 is currently communicating with the V72 Ethernet module. By responding to the “Strike ‘T’” message in the Logged Users Menu with “T” (Terminate) you will see a screen that asks “Enter number of connection to terminate”. See the screen that follows:

<Strike "T" to terminate a session, any other key to continue.> T

By responding with “2” to the “terminate a session” message, the V72 will respond with a menu that is similar to the following:

```
Enter number of connection to terminate, <CR>: 2
Connection being terminated.
```

Active Users:

Address/Port	Internal TX/RX	Net Data Flo	TX/RX	Bus Data Flo	TX/RX
1) *200.4.3.10	none/none	ok/ok	no/ok		
2) -200.4.3.10	2,3/2,3	ok/ok	ok/ok		

The (-) before the address located at Active User number 2 indicates that the session to Active User 2 will be terminated.

V72 Status & Diagnostics Menu.

```
System ..... 1
Internal Communications..... 2
Network Interface..... 3
Logged Users ..... 4
Exit ..... X
```

By responding with “X” to the “Exit” message, the user will exit from the V72 Status and Diagnostics Menu

5.6.5 EXIT

By responding to the *Enter Request:* message in the V72 Status & Diagnostics Menu with “X” (Exit), you will exit the V72 Status & Diagnostics Menu. The V72 host module will respond with a menu that is similar to the following:

> X

5.7 LOGOUT

By responding to the *Enter Request:* message in the V72 Main Menu with “T” (Logout), you will terminate your TELNET connection. The V72 host module will respond with a message similar to the following:

```
Device A (2,1)..... 1
Device B (2,2)..... 2
Device C (2,3)..... 3
Device D (2,4)..... 4
Device A (3,1)..... 5
Device B (3,2)..... 6
Device C (3,3)..... 7
Device D (3,4)..... 8
Immediate Data Collection ..... I
Configure ..... C
Manual Connection ..... M
Unit Reset ..... R
Module Status ..... S
Logout ..... T
```

<Your ‘TELNET’ connection has been terminated>

6 ASCII STRING COMMAND METHOD

Serial I/O module ports(V74/V75) can also be selected by sending an ASCII character string to the V72 host module that consists of the Port Select Code (default is \$BT), the desired Serial I/O module number (2 to 3 for M3 DAC), (2 to 6 for M6 DAC), (2 to 9 for M9 DAC), and (2 to 16 for the M16 DAC), the desired Serial I/O module port number (1 to 4), and either *Carriage Return* (0D Hex) or *Line Feed* (0A Hex).

For example, to select Port 1 of a V74 module installed as Module 2 using the default Port Select Code, send **\$BT2,1<cr>** or **\$BT2,1<lf>** where <cr> is *Carriage Return*, and <lf> is *Line Feed*.

To disconnect, either select another V72 module or send the disconnect sequence. The disconnect sequence consists of the Port Select Code followed by *Carriage Return* or *Line Feed* (e.g., **\$BT<cr>**). Once you disconnect, you can logout by typing **LOGOUT<cr>**.

NOTE: These commands are illustrated using the default port select code (\$BT).

V72 COMMAND SUMMARY	
Command	Description
\$BTm,p<cr>	Request to connect to peripheral module "m" port "p". If module m is operating in full duplex mode, full duplex communication is established when connection is made. Otherwise, the connection is for output only (from V72 to the selected module/port).
\$BTm<cr>	Request to connect to module "m". Upon connection, the V72 will enter command mode for the selected module and the selected module will respond to its command set. The selected module may be configured by sending "\$CONFIG<cr>" after the "\$BTm<cr>".
\$BTI<cr>	Receive immediate mode data. This will cause the user to receive messages or data from modules configured to operate in immediate message mode or immediate data mode.
\$BT<cr>	Disconnect. Terminates the current operation mode or module/port connection. Network session remains active.
\$BTX<cr>	Network disconnect. Terminates the workstation session. Releases all session resources, such as modes or ports.
\$BTRI<cr>	Locates the user of the Immediate Receive Mode and terminates the session if found, releasing the mode.
\$BTRC<cr>	Locates the user of the Command/Configuration mode and terminates the session if found, releasing the mode.
\$BTRm,p<cr>	Locates the user of m,p (module,port) and terminates the session if found, releasing the port.
\$BTRS<cr>	Reset. This command is used to reset the unit.
\$BTN<cr>	Entry of this command will prevent the V72 from sending advisory or error messages to the user (see Section 4.6). This command may be useful where an automated process does not wish to contend with unit messages appearing in the data stream. By default, a connection will allow these messages to be sent unless disabled by this command.
\$BTM<cr>	Entry of this command will re-enable the V72 to send module advisory and error messages to the user.
\$BTS<cr>	Access the V72 status diagnostics menu.
m = desired module number (1 to 16), p = desired port number (1 to 4), <cr> = <i>Carriage Return</i>	

7 MESSAGES

The V72 generates various messages in response to certain commands/situations as described in the table below.

V72 MESSAGES	
Message	Description
Module "m" not installed	Issued when a user tries to connect to a peripheral module or port that was not reported as installed to the V72. Verify that correct module number was entered. Check module operation on power-up to verify normal initialization.
Module "m" not responding	Issued when a module was reported as installed, but failed to respond within 1 second to a connection request from the V72. Repeated occurrences of this message indicate a possible problem with the module. Check module operation on power-up to verify normal initialization.
Module "m" busy	Issued when a connection request is denied by a module. A connection is typically denied when a module is already supporting a connection to another user.
Module "m", port "p" busy	Issued when a port connection request is denied by a module. A connection is typically denied when a port on the module is already supporting a connection to another user.
Login successful	Issued when a user completes the login sequence successfully. Upon the receipt of this message, the user has full access to the DAC and may issue any valid V72 command.
Login failed	Issued when user enters erroneous password. Password is case sensitive and will not tolerate any backspaces or character deletes.
Immediate Mode in use	Issued when a user tries to enter immediate receive mode (by entering "\$BTI<cr>") and another user is already using the resource. Immediate receive mode may only be used by one user at a time.
Command/Configuration Mode in use	Issued when a user tries to connect to a module (not a port) for command mode or configuration purposes (by entering "\$BTm<cr>") and another user is already using the resource. Command/Configuration mode may only be used by one user at a time. This particular message indicates the current user is a network client.
Command/Configuration Mode in use by Service Port. To release mode, terminate Service Port connection.	Issued when a user tries to connect to a module and the module is in use by a user connected to the service port. To free the resource, the Service Port connection must be terminated from the device connected to it.
Resource released	Issued when the user of a module or port is successfully located and the associated process is terminated. See "Resource Release Function" (<i>Section 4.4</i> of this addendum).
Resource not released	Issued when the user of a node or port is successfully located, but the associated process could not be terminated. For example, if the user wanted to release the Command/Configuration Mode, but the current user was connected via the Service Port, the resource would not be released.
No resource user found	Issued when no open connection could be associated with the specified mode or port.
Connecting....Connected	Issued to provide status of Telnet Client connection request. Dots are issued at 1/sec until the connection is established. If the connection cannot be established because the host fails to respond, the connection request will time out in about 30 seconds.
Cannot connect to host	Issued when a host refuses to accept or fails to respond to a connection request.
Host session terminated	Issued when a connection is terminated by either the host or the

V72 MESSAGES	
Message	Description
	client.
m = module number (1 to 16), p = port number (1 to 4)	

8 MODULE DIAGNOSTICS

The V72 provides two diagnostic modes to the user. The first is an LED-based diagnostic, where the module uses its LEDs to convey information about hardware or configuration errors which will prevent network access. The second is an interactive diagnostic, which provides operational information which may help a user or Bay Tech technical support personnel to diagnose the source of a problem.

8.1 LED INDICATORS

The V72 has two LED indicators on the rear panel and four LED indicators on the front panel of the base unit corresponding to the module slot where the V72 is installed (i.e., *Module 1, Module 2*, etc.). The two LEDs on the module rear panel are marked as *LINK* and *RX/TX*. The green *LINK* LED illuminates if the V72 has a good 10BASE-T connection. Failure of this LED to illuminate indicates a physical connection problem only if twisted pair cabling is being used. The red *RX/TX* LED indicates network activity.

The four LED indicators on the front panel of the base unit are used for diagnostics and operation.

8.2 DIAGNOSTIC LED INDICATIONS

When the M-Series DAC unit is reset or powered up, the LEDs on the base unit will go through a scanning sequence beginning with Module 1 Port 1 and ending with the highest module number Port 4. Then a certain number of LEDs corresponding to the number of installed modules will stay on for a brief period of time. For example, if six modules are installed, the LEDs for Module 1 Ports 1 through 4 and Module 2 Ports 1 and 2 will stay on briefly. Next, the LEDs will scan down beginning with the highest module number Port 4 and ending with Module 1 Port 1. If you notice one of the LEDs corresponding to the number of installed modules stay on after the LEDs scan down, this indicates a failure with the corresponding module. For example, if the LED for Module 1 Port 2 stays on after the LEDs scan down, then Module 2 has a problem.

The V72 will give diagnostic indications approximately five seconds after completion of the reset/power-up scan. The first diagnostic indication is a hardware check. If the V72 hardware checks out, all four V72 LEDs will flash once.

If a hardware failure is detected, one of the first three LEDs for the V72 module will flash continuously. If this happens, you should contact BayTech.

If the hardware check passes, the V72 will read the configuration parameters from the main board non-volatile RAM. If the V72 configuration checks out, all V72 LEDs will flash once. Therefore, if the V72 hardware and configuration checks both pass, you should notice all four LEDs on the V72 flash twice. If you notice that one of the V72 LEDs flashes continuously after the hardware check passes (i.e., after all four V72 LEDs flash once), this indicates that a configuration error has been detected. If this happens, the V72 will not respond to any network access attempts. Configuration problems can be corrected by programming the indicated parameter as follows:

V72 CONFIGURATION DIAGNOSTIC LED DESCRIPTION	
Flashing LED	Description
1	Non-volatile Memory Fault. The data stored in the non-volatile RAM for the V72's location contained an error. This causes the device in question to be programmed with default parameter information and the IP and Gateway addresses and the subnet mask will be set to 0.0.0.0. The module will need to be reconfigured and reset before it can operate. This symptom will occur when the V72 is installed into a module slot previously occupied by a different module type.
2	Ethernet Address Fault. If an error occurs in the retrieval of the module's Ethernet address, the address will be set to all 0s, an invalid address. Before the module can operate, it will need to be programmed with a proper address. This address cannot be programmed directly by the user. Contact BayTech if this LED symptom occurs.
3	IP Address Fault. When a module is first installed, it will program its IP Address to 0.0.0.0. The IP Address will need to be programmed before the module can operate.
4	Subnet Mask Fault. When a module is first installed, it will program its Subnet Mask to 0.0.0.0. The Subnet Mask will need to be programmed before the module can operate.

NOTE: When you power up the M-Series DAC with a V72 installed for the first time, the LEDs for Ports 3 and 4 for the V72 will flash continuously until you program the IP Address and Subnet Mask (see *Section 5*) and reset the unit.

8.3 OPERATIONAL MODE

When the module passes its hardware and configuration checks, it will then enter operational mode. In operational mode, the following LED indications may be observed.

V72 OPERATION DIAGNOSTIC LED DESCRIPTION	
LED	Description
1	Active Connection. This LED will remain illuminated for about 30 seconds after the last network connection is terminated.
3	Duplicate IP addresses--another mode on the subnet has the same IP address
4 (flashing)	Cabling Error. This LED will flash continuously when a transmission attempt fails from a cable or a connection malfunction. Once this condition is detected, the module will periodically attempt to transmit on the link and this LED will flash as long as the transmission attempt fails. When the cable problem is corrected, this indication will cease with no further intervention by the user. However, connections may have been lost and will need to be checked and reconnected if necessary.

8.4 INTERACTIVE DIAGNOSTICS

The interactive diagnostic may be accessed either through the Service Port via the V72's configuration menu, choice "7" (see Section 5 for the procedure to access module configuration) or through a TELNET session, by entering the command "\$BTS" <CR>, where "\$BT" is the module select code. In either case, the user will then be presented with a menu similar to:

```
V72 Status & Diagnostics Menu.
System ..... 1
Internal Communications.. 2
Network Interface..... 3
Logged Users ..... 4
Exit ..... X
```

Pressing "1" displays system status information. This includes information about the amount of local memory available for data, system memory (resident on any installed M03 modules), the number of TCP sessions active, the module numbers of any modules (V74/V75) that have messages queued to send to the user, the Immediate mode user (the IP address of the workstation collecting immediate mode data, if there is one), the Command/Configuration mode user (the IP address of the workstation using the Command or Configuration mode, if there is one), and the system up time.

Pressing "2" displays information about internal bus communications. There is a log of bus errors (since last reset) and status of the bus transmit channel.

Pressing "3" will show the status of the network communications hardware and associated parameters. Status of the network connection, a count of network errors since last reset, transmit errors, network transmit buffer count and status of the network packet receive queue are shown.

Pressing "4" displays a list of the connections currently hosted by the module by IP address. For each session, internal module/port connections in the transmit and receive directions are shown if they exist. Also, an indication is given for whether or not a connection can send and receive data on the network and on the internal bus. TX data flow is data in the module's outbound direction, RX data flow is data in its inbound data direction. In cases where data is not being received at a destination, this screen can help determine the source of a problem. For example, if a workstation is attempting to send data to an RS-232 device connected to a V74 which has handshook its port connection, a user can identify this situation by noting that Bus Data Flo is set to "no" in the TX direction.

9 V72 & V72TP CONFIGURATION

Configuration changes for the V72 & V72TP host communications modules are made from the service port or service modem using the following procedure:

1. If configuring from the service port, connect a terminal to the EIA-232 service port and configure the terminal's serial parameters to 9600 baud rate, 8 word size, 1 stop bit, and no parity. If configuring from the service modem, establish a connection between the remote terminal and service modem by dialing into the service modem. Once the unit is powered on, a message similar to the following will be sent out of the service port:

This same message will be sent to the remote modem once a connection is established with the service modem.

The service modem has priority over the *EIA-232* service port. When a connection is established between a remote modem and the service modem, the following message will be sent out of the *EIA-232* service port:

Incoming call
Service port access locked out

A terminal connected to the *EIA-232* service port is not allowed access to the M-Series unit while the service modem has a connection with a remote modem. If a user connected to the *EIA-232* service port is currently communicating with the M-Series unit and a remote user attempts to access configuration mode through the service modem, the remote user is not allowed access to the M-Series unit.

2. Place the desired host module into command mode by sending **\$BTm<cr>** or **\$BTm<lf>** where m is the desired module number (1 to 16) <cr> is *Carriage Return* and <lf> is *Line Feed*.
3. Access configuration mode by sending **\$CONFIG<cr>**. No characters should be typed between **\$BTm<cr>** and **\$CONFIG<cr>**.

9.1 MAIN CONFIGURATION MENU

The V72 will respond to the receiving of **\$CONFIG<cr>** with an identification block and a menu of the available configuration options similar to the following:

```
M-Series V72-TP DAC Host
Unit: 1 Module: 1
F 0.24 Copyright (c) 1995-1997
Bay Technical Associates

IP Addr: 200.4.3.190      Subnet Mask: 255.255.255.0
Gateway Addr: 200.4.3.1  Select Code: SBT
Ethernet Addr: 00.C0.48.1A.24.5D  ID MSG/Login: enabled/enabled
Unit Mem (MB): 16      IMR/CRT: disabled/disabled
TCP Sessions: 0

IP Address..... 1
Subnet Mask..... 2
Gateway..... 3
Select Code..... 4
Password..... 5
User Interface..... 6
Diagnostics..... 7
Exit..... X
```

NOTE: The Unit Mem (MB) line, showing the amount of memory is displayed only if an M03 memory module is installed.

You can now make whatever changes are necessary by responding to the above menu. The "X" selection (Exit Configuration) will return you to the operations mode.

9.2 IP ADDRESS

By responding to the *Enter selection:* message at the end of the main configuration menu with "1" (IP Address), you can program the IP address. The V72 will respond with:

Enter IP address in dotted decimal form:

Enter the desired IP address as a series of four numbers separated by periods (e.g., 197.3.14.9) followed by *Carriage Return*.

NOTE: The first part of the IP address is determined by assigned network address.

IMPORTANT: The IP address must be programmed before the V72 module can be accessed on the network. After programming the IP address, the M-Series unit must be reset for the new information to take effect.

9.3 SUBNET MASK

By responding to the *Enter selection:* message at the end of the main configuration menu with "2" (Subnet Mask), you can program the Subnet Mask. The V72 will respond with:

Enter Subnet Mask in dotted decimal form:

Enter the desired Subnet Mask as a series of four numbers separated by periods (e.g., 255.255.255.0) followed by *Carriage Return*.

IMPORTANT: The Subnet Mask must be programmed before the V72 module can be accessed on the network. After programming the Subnet Mask, the M-Series unit must be reset for the new information to take effect.

9.4 GATEWAY

By responding to the *Enter selection:* message at the end of the main configuration menu with "3" (Gateway), you can program the Gateway or router address. The V72 will respond with:

Enter Gateway address in dotted decimal form:

Enter the desired Gateway or router address as a series of four numbers separated by periods (e.g., 197.3.14.1) followed by *Carriage Return*.

IMPORTANT: After programming the Gateway address, the M-Series unit must be reset for the new information to take effect.

9.5 SELECT CODE

By responding to the *Enter selection:* message at the end of the main configuration menu with "4" (Select Code), you can change the port select code to any ASCII character string from 1 to 8 characters. The V72 will respond with:

Enter Select Code (8 chars max):

Type the desired port select code followed by <ENTER>. The V72 saves the new port select code permanently in the non-volatile memory and return to the main configuration menu.

NOTE: The select code is case sensitive. You cannot program the port select code to be \$BT from the service port or service modem.

NOTE: It is not necessary to reset the unit for this option to take effect.

9.6 PASSWORD

By responding to the *Enter selection:* message at the end of the main configuration menu with "5" (Password), you can program the V72 Password. The password is used for security purposes to prevent unauthorized users from connecting to the V72 and accessing its functions. The V72 will respond with a menu similar to the following:

Current password: BTA
Enter Password (8 chars max):

Type the desired password up to eight ASCII characters. Press <ENTER> to return to the main configuration menu.

NOTE: The password is case sensitive. Any non-alphanumeric character including <BACKSPACE> and <DELETE> or a password greater than eight characters is interpreted as an input error and you will be prompted to enter the password again.

Terminate the password entry by typing the <ENTER> key. The V72 will respond with:

Accept password as typed above? (Y/N) :

Press "Y" to accept the new password or "N" to reject it. If you press "N", the V72 will return to the "Enter Password" prompt. If you type "Y", the V72 will return to the main configuration menu.

NOTE: It is not necessary to reset the unit for this option to take effect.

9.7 USER INTERFACE

By responding to the *Enter selection:* message at the end of the main configuration menu with "6" (User Interface), you will be presented with four sequential prompts for option changes to the V72 Ethernet Module's configuration. The four configuration option prompts are to enable or disable the (1) Module ID Message {ID MSG}, (2) Login Procedure {Login}, (3) Immediate Mode Message Quick Release {IMR} and (4) Carriage Return Translation {CRT}.

9.7.1 ID MSG: Module ID Message

Press "E" to enable the Module ID Message, press "D" to disable the ID Message or press <ENTER> to leave the option unchanged. The default is "enabled". The V72 prompt for this item is:

Enable/Disable Module ID Message? (E/D):

9.7.2 Login: Login Procedure

Press "E" to enable the Login Procedure, press "D" to disable the Login Password Procedure or press <ENTER> to leave this option unchanged. The default is "enabled". The V72 prompt for this item is:

Enable/Disable Login? (E/D):

NOTE: It is not necessary to reset the unit for this option to take effect.

9.7.3 IMR: Immediate Mode Message Quick Release

Press "E" to enable the Immediate Mode Message Quick Release Procedure(V74/V75 messages sent to the user upon receipt). Press "D" to disable this procedure, returning the module to normal message handling mode. Press <ENTER> to leave this option unchanged. The default is "disabled". The V72 prompt for this item is:

Enable/Disable Immediate Mode Message Quick Release? (E/D):

9.7.4 CRT: Carriage Return--Strip Line Feeds Or Nulls

Press "E" to make the V72's Telnet processor to strip line feeds or nulls which follow carriage returns. Press "D" to allow the characters to pass through and press <ENTER> to leave this option unchanged. The default is "disabled". The V72 prompt for this item is:

Enable/Disable the LF/NULs after CR? (E/D):

10 GETTING STARTED

Before the V72 or V72TP and the DAC can be used, there are a few parameters which must be configured by the user.

First time power-up: When the V72 or V72TP is first powered up, it will cycle through its diagnostics until it finds that it has not been programmed with an IP address or subnet mask. At this point, it should flash its front panel LEDs 3 & 4. An IP address and subnet mask are minimum requirements for module operation. These parameters are configured using the following procedure:

1. **Access the V72 through the Service Port:** The V72 is programmed through the Service Port only. Attach a 9FRJ45PC-3 or 25FRJ45PC-3 serial adapter to your PC's com port and connect a crossed RJ-45 cable between the serial adapter and the M-Series DAC EIA-232 service port. Other terminal devices may require a different adapter, consult the owner's manual or Bay Tech Technical Support. Once the cable is in place, invoke a communications program on the PC (e.g., BayTech TERM.EXE) and set the serial parameters for 9600 baud, 8 data bits, 1 stop bit, no parity. The following commands are all case sensitive, so be sure to enter them accordingly.

Type **\$BTm<cr>** where m is a number corresponding to the V72's installed location in the unit (1 to 16) and <cr> is *Carriage Return*. This number may be determined by locating the module in the unit and reading its associated module number from the back panel area.

2. Obtain the V72's configuration menu: After the module select string has been entered, you should see a message such as "Requested connection made." After receiving this message, type **\$CONFIG<cr>**. This will display the V72's status screen and the main configuration menu.

3. Program the module's IP address: Type "1" from the main configuration menu (IP Address). You will be prompted to enter an IP address in dotted decimal form. This consists of 4 numbers between 0 and 255 separated by periods (ex: 200.4.123.17). After typing the desired address, type *Carriage Return* to enter the information. The V72 will return to the main configuration menu.

4. Program the module's Subnet Mask: Type "2" from the main configuration menu (Subnet Mask). You will be prompted to enter a subnet mask in dotted decimal form. This parameter is used by the V72 to determine if a destination is a local address or one that resides on another subnet. A binary representation of a properly entered subnet mask will consist of all "1"s in bit locations corresponding to the network portion of the IP address and all "0"s in bit locations corresponding to the host portion of the IP address. Observing the same conventions as for the IP address, enter the subnet mask (ex:255.255.255.128) followed by *Carriage Return*.

There may be other parameters you wish to configure, such as a gateway/router, but for now, this is enough to get going. If you wish to change other parameters at this time, consult the relevant sections of this addendum. When you are finished, type "X" at the main menu to exit configuration. Reset the unit by typing **\$BTRESET<cr>** or by cycling unit power for the changes to take effect.

After resetting the unit, you should see all 4 module LEDs flash on and off two times and then remain off. This is a normal initialization indication. After the second LED flash, the module is on line and ready for network access.

Configuration of other modules on the unit may be necessary or desirable, depending on your application and unit module population. This configuration may be accomplished through the V72 or the service port. If you need additional help, call Bay Tech's Technical Support line for assistance in setting up your unit.