



BUFMC

Master Control System

INSTRUCTION MANUAL

VERSION: 060524

## TABLE OF CONTENTS

INTRODUCTION .....	3
FCC RADIO FREQUENCY INTERFERENCE STATEMENT .....	3
WARRANTY STATEMENT .....	3
OVERVIEW .....	3
INSTALLATION .....	3
OPERATION.....	5
SCREEN LAYOUT .....	5
BASIC OPERATION .....	5
SOURCE AND DESTINATION GROUPS .....	5
ENABLING LEVELS TO ROUTE .....	5
ROUTED STATUS INDICATION .....	6
RECORDING A SALVO.....	6
EXECUTING A SALVO.....	6
GPI SALVO .....	7
LOCKING ROUTES .....	7
CONFIGURATION - ENGINEERING MODE .....	8
SAVING CONFIGURATION CHANGES .....	8
CREATING A NEW DEVICE .....	8
RENAMING A DEVICE .....	8
ASSIGNING AN ICON TO A DEVICE .....	8
ASSIGNING ROUTER CONNECTIONS TO A DEVICE .....	8
NOTE ABOUT DEVICES USING NAMES FOR UNDERMONITOR DISPLAYS (UMD): .....	8
MOVING OR COPYING A DEVICE TO ANOTHER GROUP .....	9
DELETING A DEVICE FROM A GROUP .....	9
CHANGING THE ORDER OF LEVELS.....	9
RENAMING A LEVEL OR LEVEL GROUP BUTTON .....	9
ASSIGNING INDIVIDUAL LEVELS TO A LEVEL GROUP .....	9
RENAMING A GROUP .....	9
ASSIGNING A GROUP ICON.....	9
MOVING A GROUP .....	10
ADDING A GROUP.....	10
ASSIGNING NUMBER OF DESTINATION COLUMNS.....	10
SETTING THE STARTING GROUPS.....	10
ADDING OR CHANGING ICONS .....	10
OPTIONS.....	11
IR (INFRARED) DEVICE CONTROL.....	11
SCHEDULING .....	12
CALENDAR (MONTH) VIEW .....	13
HOURS VIEW .....	13
MINUTES VIEW .....	13
SECONDS VIEW .....	13
EVENTS VIEW .....	13
SCHEDULING FILE SYSTEM.....	13
LOGGING .....	15
MAINTENANCE .....	17
PHYSICAL.....	17
INTERCOMMUNICATION .....	17
COMPUTER COMMUNICATION.....	18
ROUTER COMMUNICATION .....	18
INTERCHANGEABILITY .....	18
TROUBLESHOOTING .....	18

## INTRODUCTION

### FCC RADIO FREQUENCY INTERFERENCE STATEMENT

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by BUF Technology could void the user's authority to operate this equipment. Shielded cables must be used with this equipment to maintain compliance with FCC regulations.

### WARRANTY STATEMENT

BUF Technology warrants that the equipment it manufactures is free from defects in materials and workmanship. Equipment that has been operated within its ratings and has not been subjected to mechanical or other abuse or modification and has failed because of such defects, will, at the option of BUF Technology, be repaired or replaced if it is returned, freight pre-paid, to BUF Technology within two years from the date of shipment. Equipment that fails under conditions other than described herein will be repaired at the price of parts and labor in effect at the time of repair.

This warranty is in lieu of all other warranties, express or implied, including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose. BUF Technology is not liable for any consequential damages.

### OVERVIEW

The BUFMC Routing Switcher Control System is a multi user station graphical user interface (GUI) for control of signal routing switchers. Up to 32 routing switcher frames are controlled which consist of any number of levels each, totaling up to 32 levels. BUFMC is an augmentation control system that simplifies complex routing tasks and gives operators a clear overall view of the status of all routing switchers in a facility. Existing routing switcher native control panels are not affected by the system and operate as usual.

The user is presented with a user friendly control surface that makes all routers in the system appear as one large multi level router. Routes are made with point-and-click ease, and levels can be enabled and disabled as needed to make breakaway routes. Routing status is shown graphically on each user station, regardless of which user stations or native control panels cause connections to be made. An unlimited number of routing salvos can be prepared offline using the same GUI as normal routing. Salvos consist of any number of routes, and provide a means for recalling commonly used setups.

The BUFMC software runs on Win95/98/Me/NT/2000/XP computers. Computers communicate with routing switchers via IFD-422M computer interfaces and IFD-422 routing switcher protocol translation interfaces. Each computer connects to an IFD-422M via an available RS-232 port, or to a computer equipped with an IFD-422M via Ethernet or other network connection. Each routing switcher is connected to an IFD-422 router interface via RS-232 or RS-422. Custom interfaces are provided at additional cost for routers that do not have serial ports.

### INSTALLATION

Locate each IFD-422 router interface box near its respective routing switcher matrix and connect to the appropriate RS-232 or RS-422 port on the router using the cable provided. Locate each IFD-422M computer interface box near its respective user station computer and connect the DB-9F (9-pin-D) connector to the computer's DB-9M RS-232 port using a pin-for-pin male/female 9-pin-D cable. If the computer has a DB-25M (25-pin-D) connector, use a cable that connects the IFD-422M DB-9 pins 2, 3 and 5 to the computer DB-25 pins 3, 2, and 7, respectively. Connect either XLR-3 connector on all IFD-422 and IFD-422M interfaces together using standard Belden 8451 or equivalent shielded audio wire with XLR-3 connectors (shield on pin 1). Normal audio cables (or microphone

cables) may be used to daisy-chain from a connector on one box to a connector on another box, then from the other connector on that box to the next box, etc. Any other topology may be used such as a star configuration. Total wire length must not exceed 1000 meters. Connect the supplied 12VDC, 500mA power supplies to the power connectors on each IFD-422 and IFD-422M and apply 120VAC power to all power supplies.

DO NOT install the "Dongle" USB security device into any user stations before installing the software which includes the proper drivers for the Dongle. If you do, you will have to use the System control panel to remove the USB Dongle device driver and reinstall the BUFMC software before the Dongle will work.

Install the BUFMC software on the user station computers. Download the software from the BUF Technology web site ([www.buftek.com](http://www.buftek.com)) and extract the BMCSETUP.ZIP file contents to a temporary location. You should end up with three files named BUFMC.ZIP, SETUP.BAT, and UNZIP. Do not extract the BUFMC.ZIP file, instead run the SETUP.BAT file which will create directories and unzip files into their proper locations. During the installation procedure, drivers for the "Dongle" security device will be installed. Now you can install the USB Dongle. Although the BUFMC software will run in the Demo mode without a Dongle security device installed, the program will not allow a COMM port to be selected to connect to a BUFBOX interface box, nor will it allow it to be selected as a NETWORKED user station. If you select either of the above, the program will immediately stop and ask for the Dongle to be installed before rerunning the program. You may need to reboot the computer after installing the Dongle for it to be recognized if you remove it while the program is running. If you want to run the program in Demo mode without a dongle, you will need to edit the BUFMC.ini file and set the COMM port to zero.

BUF Technology will prepare the initial configuration files for you. You will be given a web URL at which to find the files, which you will need to put into the CONFIG folder. Overwrite the demo files that were installed when you ran the SETUP.BAT file.

Follow the instructions on the screen to create a program icon for your desktop. Run the BUFMC program. Enter the Engineering mode by pressing the ENG button in the upper right part of the screen and entering the engineering code (4-4-4-4 by default). You should see a blue OFF LINE button in the upper right corner of the screen, click on it. A screen should come up showing you a selection of COMM ports and NETWORK. Also, a button labeled UNLICENSE will appear, do not select it. Select the COMM port to which you have connected the IFD-422M interface box, or select NETWORK if there is no IFD-422M connected to the workstation, but the workstation is connected by network to other workstations with IFD-422M's connected and BUFMC running. If you select a COMM port, a boot up sequence should occur that prepares the IFD-422M interface box for operation in your system. Once complete, the COMM STATUS button should show ON LINE, click on it to exit the COMM STATUS menu; you are ready to make routes and see router status. If instead of COMM ports, you see the message: "BUFIDS file has incorrect password", the BUFIDS and STATS files in the CONFIG folder have been altered in a way that is not allowed. You will need to restore them to the factory configured versions.

## OPERATION

### SCREEN LAYOUT

The BUFMC window is organized into three sections. The MENU section is at the top of the window and contains buttons for level selection, MENU selection, locked routing, engineering mode, and COMM STATUS. The SOURCE CHOICE section occupies the bottom left section of the screen, and is used to select source devices for routing. The bottom right area is the DESTINATIONS section, which is broken up into two or more frames of columns. Icons in the right half of each frame represent destination devices. Icons in the left half indicate connected source devices. This section is used to complete a route from a selected source to a destination and shows routed connection status. When a MENU is selected, both the SOURCE CHOICE and DESTINATIONS sections are replaced by menu choices.

The BUFMC system is designed to operate with only a pointing device such as a trackball or touchscreen and does not require a keyboard. When entering text, a keyboard drawing appears in place of the SOURCE CHOICE and DESTINATIONS sections that facilitates text entry via a pointing device. Whether typed on this keyboard or a normal one, entered characters are shown in the bottom of the keyboard drawing. The ENTER key completes a typed entry. A CANCEL button also appears that may be used to cancel the entry and revert to the original text.

### BASIC OPERATION

To make a route, select (and turn dark) a source device in the SOURCE CHOICE section. If you don't see the desired source, click the SOURCE GROUP and/or SCRL buttons in the bottom of the section until you do. SCRL shows more sources in the same group (if any), while the SOURCE GROUP button changes to other groups (left half of button changes to previous group, right half changes to next group). To complete the route, click on the destination device in the DESTINATIONS section to which you would like the source connected. (Use the DEST GROUP, and/or SCRL buttons in the bottom of the section if the desired destination is not visible). The newly routed source's icon should show to the left of the destination icon with connected levels indicated by color coded lines drawn between the source and destination. Enabled destination input levels that are not output from the source device will be routed with outputs from the special BLACK source. Sources and destinations appear grayed out if they have no enabled levels that can be routed.

Normally a source becomes unselected after a route is made. To route a source to multiple destinations, click on the source again while selected to lock the selection; a black frame appears around its icon. This keeps the source selected while routing. Deselect the source by clicking on it again or by clicking in an empty part of the section.

### SOURCE AND DESTINATION GROUPS

Routable devices are arranged into groups. Each device can exist in one or more groups. Any group can be selected independently into the SOURCE CHOICE section and into the DESTINATIONS section. The name and SOURCE GROUP button of the currently selected source choices group appears in the lower right corner of the SOURCE CHOICE section. The name and DEST GROUP button of the currently selected destinations group appears in the lower left corner of the DESTINATIONS section. The right half of each GROUP button selects the next group, the left half selects the previous group. If all devices in a group do not fit in the section, a SCRL DOWN button appears and is used to scroll to the next batch of devices within the same group. Once scrolled, a SCRL UP button appears which scrolls back to the previous batch of devices. The SWAP button at the bottom of the window swaps the current SOURCE GROUP with the current DEST GROUP. The SOURCES and DESTS buttons in the MENU section display all groups and allow direct group selection.

The SOURCE CHOICE section always displays the special sources BLACK and BARTONE so they are accessible for routing at all times.

### ENABLING LEVELS TO ROUTE

Routes occur only on levels that are enabled. Depending on the BUFMC window size and the number of levels assigned, independent levels are shown in the top of the screen in one of two ways. If there is room, each level is shown as a button containing the level name and a color coded line. Click on these buttons to toggle them on and off. Dark means the level is enabled to route; light means the level is disabled and will not route. If there is not enough room for the level buttons, levels show only as color coded lines. The lines are longer when enabled than when disabled. Levels can be toggled on and off by clicking on them, but since they are small targets, it is easier to

control individual levels by using the LEVELS button in the MENU section. The LEVELS MENU shows all levels in large menu choice buttons which function identically to the MENU section level select buttons.

The ALL LEVS button appears in both the MENU section and the LEVELS MENU and is used to toggle all levels on and off. If any levels are off, they all toggle on. If all levels are on, they all toggle off. To select a single level, use the ALL LEVS button until all levels are off, then select the desired level button.

Up to eight level group select buttons appear in both the MENU section and the LEVELS MENU. Typically, they are named with general level types such as VIDEO, AUDIO, TC, and CONTROL. Level group select buttons each control a specified group of levels using the same logic as the ALL LEVS button, and make it fast and easy to make general video/audio and other generic breakaway routes.

Individual levels are represented by color coded lines in level select buttons, outputs of devices in the SOURCE CHOICE section, and inputs to devices and connections in the DESTINATIONS section. The short lines on the right of devices in the SOURCE CHOICE section represent configured outputs of each device. Level lines on the left side of DESTINATIONS section icons represent configured inputs of each device.

### **ROUTED STATUS INDICATION**

Current router connections are shown in the DESTINATIONS section. Destinations that have any connected inputs show a source icon to the left of the destination icon. If a source is selected in the SOURCE CHOICE section, it will show highlighted to the left of all destinations to which it is connected. Connected levels are indicated by color coded level lines extending all the way from source icon to destination icon. Level lines that extend about 1/3 the way from destination leftwards towards source are connected to another non BLACK source (breakaway route). Lines that are just short nubs indicate levels that are configured as inputs to the destination, but are not connected to any source or are connected to the BLACK source. Level nubs that extend from the right side of source are configured source outputs that are not connected to the destination.

**NOTE:** The following applies only when NO SOURCE CHOICE device is selected, otherwise a route will occur instead.

Click on the source icon to the left of a destination to show other sources connected to that destination. Each click cycles to the next source. Click on the destination icon to show all connected sources simultaneously using a schematic style display. Click on a source to make it the new destination along with its sources. This signal tree can be followed back many steps. Click on the destination to move back towards the original destination. Click anywhere else to leave the schematic screen.

### **RECORDING A SALVO**

Salvos are used to perform one or more preprogrammed routes automatically. Select the SALVO button in the MENU section, then select REC ROUTES. The screen will show the SALVO button selected, and no routing status to any devices in the DESTINATIONS section. Make any number of routes exactly as you normally would, including breakaway routes. A salvo's routes may involve any or all groups. The routes show on the screen as though they occurred even though they actually are not sent to the router(s). When finished, select the SALVO button in the MENU section, then select SAVE. Enter the desired salvo filename. The routes are saved for later recall, and actual routing status indication is restored. Salvos are stored as files in the "salvo" folder and can be deleted and copied using the computer's operating system.

### **EXECUTING A SALVO**

Select the SALVO button in the MENU section, then select EXECUTE. Buttons appear with the names of all saved salvo filenames in alphabetical order. If all saved salvos do not fit, a SCRL button appears that scrolls to the next group of salvos. Select a salvo filename button to execute the recorded routes. All routes that were recorded and saved into that salvo filename will be sent to the router(s). Use care not to choose the wrong salvo. Selecting the SALVO button in the MENU section while salvos are executing will terminate the remaining routes in the salvo, but ones already sent are irrevocable.

Salvos are designed to work correctly even after device router assignments have been changed. Salvo routes are stored by internal device numbers and enabled levels. Execution of a salvo that was recorded before a device was assigned different router inputs and outputs will later execute correctly using the new assignments.

### **GPI SALVO**

The GPI Salvo is a special salvo that is executed via contact closure. Pin 6 of the serial port used for connection to the IFD-422M (the RS-232 DSR input) is used as the GPI (general purpose interface) input. If a salvo is created and named "GPI", it will be executed when pin 6 is driven to a low level (near ground) for at least 1 second. Pin 6 must be at a high level (> 3V) for at least 10 seconds before being brought low. A 1K resistor may be connected from pin 7 to pin 6 to provide this voltage; connect pin 6 to ground (pin 5) to execute the salvo.

### **LOCKING ROUTES**

Locked routes are useful when making important routes that should not be changed inadvertently. Select (turn dark) the LOCK (padlock) button in the MENU section. When a route is made while the LOCK button is selected, a padlock is drawn over the destination being routed. All user stations will show this locked status. When any user attempts to route into a locked destination, a prompt appears asking if the user really intends to override the lock, and offers the opportunity to cancel the route. If a salvo execution attempts to route into a locked destination, the prompt appears with the additional choice of canceling the remainder of the salvo along with the current route. Some routers, those that include lock support in their protocol, will also send locked status to control panels and reflect control panel locks on the BUFMC screen.

## CONFIGURATION - ENGINEERING MODE

Select the ENG button in the MENU section and enter the engineering password to enable the engineering mode. The default engineering password is 4444. The password can be changed by the engineering department (call factory for instructions). Once enabled, the ENG button shows red and extra buttons appear in certain menus.

Click the red ENG button to exit the engineering mode, but make sure to save changes (see SAVING CONFIGURATION CHANGES).

### SAVING CONFIGURATION CHANGES

Changes made in the engineering mode must be saved by selecting the LEVELS button in the MENU section, and selecting the red SAVE button. If this is not done, the next time BUFMC is run, the configuration will revert to as it was before changes were made. Before saving changes, BUFMC automatically saves a backup copy of the current configuration in a date-time coded folder in the "ConfBaks" folder. To revert to a backup configuration, simply copy the contents of a backup folder into the "config" folder and quit and rerun BUFMC.

### CREATING A NEW DEVICE

Select the LEVELS button in the MENU section. Select the red NEW button. A new device named "NEW" appears in the current SOURCE CHOICES section group. If a source was selected, the new device appears at that location and others ripple down to make room, otherwise it appears at the end of the group's assigned devices. The new device will be in the selected state. A maximum of 1000 devices can be assigned. A maximum of 80 devices can be assigned to each group.

### RENAMING A DEVICE

Click in the name of a device in the SOURCE CHOICES section, then enter the new name. The name can be up to 16 characters long, but long names are displayed with very small type, so it is better to keep names short.

### ASSIGNING AN ICON TO A DEVICE

Select a device in the SOURCE CHOICES section. Select the LEVELS button in the MENU section. Select the red ICON button. A selection of icons is displayed; select one to assign it. If you don't see an appropriate icon, use the SCRL buttons to see more choices. Click the LEVELS button in the MENU section to cancel.

### ASSIGNING ROUTER CONNECTIONS TO A DEVICE

Select a device in the SOURCE CHOICES section. Select the LEVELS button in the MENU section. To assign a router output (destination) to a device input, select the IN button in a level button and enter the router output number. To assign a router input (source) to a device output, select the OUT button in a level button and enter the router input number. Repeat this process for all levels connected to the device

#### **NOTE ABOUT DEVICES USING NAMES FOR UNDERMONITOR DISPLAYS (UMD):**

Undermonitor displays (UMD) use device names rather than numbers. A UMD may be an LED or other type of physical alphanumeric display that mounts under a monitor or may be text assigned to a window on a windowing device. In either case, the monitor or window is presumed to be fed by a video destination, which will at any given time have a source routed into it. A separate "router level" is used for the UMDs that has destination assignments (device IN) for each UMD address, and source assignments (device OUT) for all devices that could be routed into the level which feeds the monitors/windows. The UMD source numbers need not match the video assignments, they are used simply to point to the routed device's name as routes are made. The names themselves are periodically sent to the UMD interface BUFBOX at a rate of about one per second. When a "route" is taken to a UMD I/F, the number assigned to the source is used to lookup the name assigned to that source, which is then sent to the UMD itself. One UMD BUFBOX can service up to 256 displays, and only one UMD BUFBOX can exist in a system. The UMD acts as a one level router in the system and must have the router name "UMD", which flags the system to send the names of all devices assigned a source on that level onto the BUFNET. Since 1024 sources are supported on any level, UMD names are limited to that number also. It is important that all user stations have the same names assigned to UMD level sources or name flickering will occur on the displays.



### MOVING OR COPYING A DEVICE TO ANOTHER GROUP

Select a device to be moved or copied in the SOURCE CHOICES section. Select the LEVELS button in the MENU section. Select the red COPY button. Select the group to which you want the device copied or moved. Select the source location within the group where you want the copied device to appear. Select the LEVELS button in the MENU section. Select the red PASTE button. The copied source will appear in place of the selected source and sources will ripple down to make room. If no source is selected, the copied device will appear at the end of the group's currently assigned devices. See DELETING A DEVICE FROM A GROUP if you want the device moved rather than copied.

### DELETING A DEVICE FROM A GROUP

Select a device to be deleted in the SOURCE CHOICES section. Select the LEVELS button in the MENU section. Select the red DELETE button. The selected device will be removed from the current SOURCE CHOICES group. The other devices after the removed device will ripple up to fill the empty space. If the device does not appear in any other group, it will not be deleted unless you first remove all IN and OUT assignments. (Select an IN or OUT button in a level button, select DEL, then ENTER).

### CHANGING THE ORDER OF LEVELS

Internally, levels are organized by router, then by the order they appear on each router. However, the level order presented to the operator, for both selection and indication, can be changed as desired. Select the LEVELS button in the MENU section. Select the MOVE LEVEL button. All levels are deselected. Select the level you want to move, then select the button to which it should be moved. The other level buttons will ripple as needed to fill the old location and to make room for the new one. Level buttons and indicators in the MENU section will be arranged in the new order. Level indicators on sources and destinations will also appear in the new order.

### RENAMING A LEVEL OR LEVEL GROUP BUTTON

Select the LEVELS button in the MENU section. Select the NAME LEVEL button, then select the individual level or level group button to be renamed. Enter the desired name (6 characters maximum). The new name shows in the LEVELS MENU button and in the MENU section if visible. Unnamed levels after the last named level will not be visible and will not be selected by the ALL LEVS or level group buttons. Unnamed level group buttons after the last named level group button will not be visible.

### ASSIGNING INDIVIDUAL LEVELS TO A LEVEL GROUP

Select the LEVELS button in the MENU section. Select the individual levels you want assigned to a level group. Select the SET GROUP button, then select the (green) level group button to which you want the selected levels assigned. Any selected levels that are assigned to other groups will remain assigned to those groups also.

### RENAMING A GROUP

Select the group to be renamed in either the SOURCE CHOICES or DESTINATIONS sections, then select the SOURCES or DESTS button in the MENU section, respectively. Select the red GROUP NAME button, and enter the desired group name. A change made to either side affects both (source and dest groups are identical).

### ASSIGNING A GROUP ICON

Select the group in either the SOURCE CHOICES or DESTINATIONS sections, then select the SOURCES or DESTS button in the MENU section, respectively. Select the red ICON button, and choose the desired group icon from the choices shown. A change made to either side affects both (source and dest groups are identical). To create additional group icons, make a copy of the grpblnk.bmp and grpblnks.bmp files in the BUFMC\BMPS folder and rename them anything starting with grp (must end in .bmp, and don't add 's' before the .bmp). Then edit the files and add the desired art using your favorite bitmap image editor. Make sure not to change the color type (24 bit RGB) or size. The file with the 's' added before .bmp is the *selected* version of the icon, the other one is the *unselected* version. The next time you reboot the program, the new icons will appear as choices.

### **MOVING A GROUP**

Select the group to be moved in either the SOURCE CHOICES or DESTINATIONS sections, then select the SOURCES or DESTS button in the MENU section, respectively. Select the GROUP MOVE button, and select the group button to which the selected group is to move. The other groups will ripple to fill the button being moved and to make room for the new location.

### **ADDING A GROUP**

Select the SOURCES or DESTS button in the MENU section, then select the red NEW GROUP button. Once created, a new group cannot be removed. A new group named "NEW" will be added to the end of the current groups. Use RENAMING A GROUP and MOVING A GROUP to name the new group and place it where desired. A maximum of 50 groups can be assigned.

### **ASSIGNING NUMBER OF DESTINATION COLUMNS**

Select the LEVELS button in the MENU section. Each time the red DEST COLUMNS button is selected, the number of "suggested" destination columns is incremented up to the maximum of 5, then back to the minimum of 2. Depending on the screen size, the suggested number of destination columns may or may not be used.

### **SETTING THE STARTING GROUPS**

The starting groups are the SOURCE CHOICES and DESTINATIONS groups that are displayed when the program is started. To set them, first select the desired groups in the normal way (see SOURCE AND DESTINATION GROUPS), then select the LEVELS button in the MENU section and select the START SCREENS button.

### **ADDING OR CHANGING ICONS**

Device icons are stored as simple bitmap files in the BMPS folder and are loaded when you run the program. To create new icons, use the blank.bmp and blanks.bmp files as templates. Copy both files and replace "blank" with a unique 7 character or less name that does not end in "s". Make sure not to delete the blank or any other existing icon files. Use your favorite paint/photo program to add graphics to the bitmap images. Add the same graphics to both versions, the one ending in 's' is used by the program to indicate *selected* status. After adding icon files, run the program and use the engineering mode to assign them to devices. There is a limit of 2000 device icons.

Icons beginning with grp are group select icons. Device icons cannot begin with grp.

If desired, any or all icons may be customized to change the look of the program. Generally, the sizes should be preserved, however the program will adapt to different icon sizes in most cases. Icons must be 24 bit RGB format.

## OPTIONS

BUFMC offers optional features which are enabled by variables in the configuration files. Contact the factory to purchase these optional features.

### IR (INFRARED) DEVICE CONTROL

When combined with one or more IR-1600 Infrared Remote Transmitters and the Device Control option, BUFMC can control infrared controllable devices. IR-1600's connect to the BUFNET like IFD-422 Router Interfaces, and up to sixteen IR emitters. Each Stick-On IR Emitter connects to one of the mini jacks on the IR-1600 rear panel, and sticks directly on the IR receiver on a controlled device. The first IR-1600 in a system is programmed to service Control Ports 1-16, and each additional IR-1600 services the next 16 Ports. Use the COMM STATUS menu (select the ON-LINE button while in ENG mode) to check if the IR-1600 is talking on the BUFNET. The IR commands and remote panel image used to control the device is called a "Control Set".

To control a device that has a Control Set assigned, select the device in the SOURCE CHOICES section, and click on the CTL button. If the selected device has no Control Set assigned, the CTL button will be grayed out. Alternately, select the CTL button first, then select the device to be controlled in the SOURCE CHOICES section. Devices that have no Control Set assigned are grayed out when the CTL button is selected. An image of the remote control panel assigned to the device appears in the DESTS section. Simply click on buttons on the panel image to issue the programmed IR commands to the selected device. If in SALVO RECORD mode, each button click will be saved in the salvo and can be scheduled for automatic operation if the Scheduling option is enabled.

Control Sets are defined by human readable TXT files which are stored (by default) in the CTLSETS folder (this location can be changed by modifying the BUFMC.INI file). On boot up, if the Device Control option is enabled (DEVICECONTROL keyword appearing in the STATS file), all TXT files in the CTLSETS folder are loaded for use by the program. BMP format image files are used to represent IR remote panels on the screen and are located in the BMPS folder. Control panel image filenames start with CTL, are in 24 bit RGB mode, and are about 400-600 pixels in height. A companion image file for each control panel is used to detect hits on the various buttons on each remote. This file has the same name except with the letter 's' added to the end of the root name: visible panel image file CTLremote1.bmp and its companion "hit" file CTLremote1s.bmp. The "hit" image has the same dimensions as the visible image, except each button is painted with a unique solid color. The background is also painted a unique solid color to differentiate it from the buttons. When learning, BUFMC stores the color of each button clicked in order to identify it. This method allows buttons of any shape to be used by the program. To create visible and "hit" image files for a new control panel:

1. Take a photo of the remote panel or draw it using your favorite paint program.
2. Using your favorite paint program, resample the image to about 400-600 pixels high and save it in the BUFMC\BMPS folder as a 24-bit RGB format BMP file using a unique filename starting with CTL (CTLfile.bmp)
3. Make a copy of the file and add the letter 's' to the end of the root filename (CTLfiles.bmp).
4. Edit the 's' file and paint each button a unique color, then select all keys, invert the selection, and paint the background a unique color. The colors used are not important as long as each is a different unique color.
5. Reboot the BUFMC program, the new panel image should be a choice when assigning Control Sets.

To learn IR pulses into a Control Set, the IR remote to be learned is pointed into either of the holes in the front or rear of the IR-1600. A separate RS-232 PC comm port must be connected to the LEARN 9-pin female connector on the rear of the IR-1600 (the one below the empty hole). The connection is pin-for-pin to a 9-pin PC RS-232 port. IR pulses can be learned in normal mode (ON-LINE) or while operating in demo mode (OFF-LINE) using any PC. The TXT files created in the CTLSETS folder can then be copied to all BUFMC user stations. No dongle is needed to learn and assign IR Control Sets.

To assign a Control Set to a device, enter the Engineering mode (click on ENG button and enter 4-4-4-4 password - it should turn red). In the SOURCE CHOICES section, select the device that is to be assigned a Control Set, then click on the CTL button. Various icons of IR remotes will show in the DESTS area. Select either an existing Control Set or a new one to be programmed. Icons with names enclosed in ( ) have not been programmed with IR pulse data (no TXT file), and only represent images that can be programmed. Remotes that are programmed can be modified (IR data added or changed) and/or copied and renamed. If an image icon is selected, you will be prompted for a new control set name. Use any valid filename to identify the new control set; a new TXT file with this name will be created in the CTLSETS folder. Enter the Port number corresponding to the connector on the IR-

1600 that the device's IR emitter is connected to. This will be 1-16 (from left to right on the rear panel) for the first IR-1600 in the system (17-32 for the second, etc.).

To learn IR pluses, click the LEARN button. You will be prompted to enter the comm port number that is connected to the IR-1600 LEARN port. When you point an IR remote into the hole in the front or back of the IR-1600 and press a button on the remote, you should see information describing the detected pulses above the panel image. If the number of pulses has a + sign, try pressing and releasing the button more quickly until a smaller number of pulses is detected. If "incompatible" shows on the screen, the basic type of pulses assigned to this Control Set is too high and exceeds the IR-1600's capability (this can happen if you try to learn pulses from more than one type of remote into the same Control Set). Once you see repeated and similar numbers show for the button you are pressing, click on the matching button on the panel image. You will be prompted to name the button. The button name is used to identify the button when scheduling, storing salvos, etc., so it is best to use standard names that exactly match names on panels of similar function (PLAY, STOP, FF, REW, VOL+, VOL-, CH+, CH-, etc.). This way, if you replace the device, for example DVD1, with a different brand DVD and reassign it with the new brand's Control Set, any scheduled events you already have for this device will still work. You can also name panel image buttons (keys) before you learn IR pulses by pressing the NAME KEY button. If you are modifying an existing Control Set (e.g. adding new buttons), you will be asked if you want to modify the existing set or copy its data into a new set with a new name. You may be programming buttons into a Control Set you started earlier, so want to modify the set, or you may be creating a new Control Set that has the same codes for basic features as an existing one but with added features, in which case you would want to use a new name for the enhanced Control Set. The DEASSIGN CTL SET button removes the Control Set assignment from the selected device. Any learned data will still be stored in the Control Set, and can be assigned to any number of devices. Each time the LEARN button is selected, the LEARN comm port number must be reentered. To save the new Control Set on disk, Press LEVELS, then SAVE. If you quit the program, you will be prompted to SAVE ENGINEERING CHANGES, if you answer DON'T SAVE, all unsaved programming will be lost.

## SCHEDULING

BUFMC Scheduling allows routes, control commands, or salvos to be executed on a Date/Time schedule. The system calendar/clock of the PC that BUFMC is being run on is used as the time base for event execution, so it is important to make sure that it is always set accurately. If events are scheduled on more than one user station (for redundancy purposes), these events will execute irrespectively of each other and any ramifications of repeated execution (particularly IR commands) should be carefully considered. Events are deleted from the master schedule as they are executed.

Any year, month, day, hour, minute, and second can be selected, allowing events to be manipulated on a one second resolution. The exact time that scheduled events actually occur will tend not to be on the second, especially when multiple events are scheduled for the same time. The following characteristics should be considered:

1. Scheduled events are given the highest priority, and will execute before user initiated events or salvos.
2. Events that are scheduled to occur in successive seconds will be executed in the order scheduled.
3. Successive events can occur more quickly than scheduled (if an event is sent late in the second, the next second's event could follow immediately).
4. Events scheduled to occur at the same second will be executed in an arbitrary order (if order is important, schedule at different seconds).

To view, add, or delete scheduled events, click on the SCHED button at the top of the screen. One of several views shows in the main screen area along with the "selected" date and time.

The NOW button selects the current date and time dependent on the last used time related view (HOURS = HH:00:00, MINUTES = HH:MM:00, SECONDS = HH:MM:SS).

The ADD button adds a new event at the selected time. If the selected event is visible within the selected date/time, it is highlighted in red and the REMOVE and EVENT TIME buttons appear.

Click REMOVE to delete the event from the schedule.

Click EVENT TIME to select the event's date/time.

Use view buttons to select between these views:

### CALENDAR (MONTH) VIEW

Calendar view shows the date in calendar format and any events that will fit. The MONTH- button shows the previous month, the MONTH+ button shows the next month. Click in the calendar to select a day - midnight becomes the selected time.

### HOURS VIEW

Hours view shows a day's worth of hours and any events that will fit. The DAY- button shows the previous day, the DAY+ button shows the next day. Click on an hour to select it at zero minutes and seconds.

### MINUTES VIEW

Minutes view shows an hour's worth of minutes and any events that will fit. The HOUR- button shows the previous hour, the HOUR+ button shows the next hour. Click on a minute to select it at zero seconds.

### SECONDS VIEW

Seconds view shows a minute's worth of seconds and any events that will fit. The MINUTE- button shows the previous minute, the MINUTE+ button shows the next minute. Click on a second to select it.

### EVENTS VIEW

Events view shows scheduled events starting at the selected date/time, and until the end of the selected date. If more events are scheduled than will fit on the screen, a SCROLL+ button appears that scrolls the displayed events to the next batch that will fit. A SCROLL- button appears if the first event for the selected time is not being shown and will scroll to the previous batch. Click on an event to select or deselect it.

### SCHEDULING FILE SYSTEM

Once the Scheduling option has been enabled, a new folder is created for scheduling files. The default folder location with respect to where you have installed the program (usually C:\BUFMC) is "SCHEDS" (C:\BUFMC\SCHEDS). The location for scheduling files may be moved by changing the appropriate entry in the BUFMC.ini file.

Scheduling entries can be added or deleted by storing a file with a filename "Sched?.txt" in the SCHEDS folder. The ? must be replaced with any character, allowing multiple scheduling files to be created in some other folder and copied into the SCHEDS folder when you want them to take effect. The Sched?.txt file consists of any number of entries in one of the following formats (replace the items in *italics* as described below):

```
1.
ACTION
DATE/TIME: YYMMDD HH:MM:SS
DEST: DESTNAME
SOURCE: SOURCENAME1 LEVELS: ALL
SOURCE: SOURCENAME2 LEVELS: VID TC
DURATION: HH:MM:SS
OPTIONS
```

where:

*ACTION* = SCHEDULE causes the event to be added to the master schedule.

or *ACTION* = REMOVE causes the event to be removed from the master schedule.

*YYMMDD HH:MM:SS* is Date/Time (YY = year, MM = month, DD = day of month, HH = hour, MM = min, SS=sec).

*DESTNAME* is any valid device name (must match exactly) the scheduled route will connect to its input(s).

*SOURCENAME1* is any valid device name (must match exactly) the scheduled route will connect to its input(s).

*ALL* is a list of level names that specify which signal output levels will connect from *SOURCENAME1*.

"ALL" is a special keyword that designates a take from all levels.

One or more *SOURCENAME2* lines are optional, and specify if a breakaway route is to take place. *VID* and *TC* is a list of levels that will connect from the outputs of *SOURCENAME2*. Each SOURCE: ... LEVELS: sequence overrides any previous entries, so *SOURCENAME2* would route instead of *SOURCENAME1* on the *VID* and *TC* levels because of the presence of the second SOURCE: line (if it were missing, *SOURCENAME1* would connect on these as well as all other levels).

*HH:MM:SS* specifies the duration of the route. This entry is used to determine if the scheduled event is obsolete, and so should not be routed. Normally *DURATION:* is unimportant and is used only if the BUFMC program was stopped for a period of time, during which scheduled events would otherwise have occurred, and then restarted. The events would then be (belatedly) executed only if the current time and date still fall before the *DATE/TIME: + the DURATION:*. If zeros (00:00:00) are used for the duration, the default duration of 00:05:00 is used, meaning that events will be executed only if they are less than 5 minutes old.

*OPTIONS* are either LOCK or NOOVERRIDE. LOCK causes the destination to become locked as a result of the event being executed. Normally, scheduled events will override any locked destinations and route anyway. If the NOOVERRIDE option is specified, scheduled events will not execute for locked destinations. Therefore, the LOCK and NOOVERRIDE options should never be used together, or subsequent events for a given destination will not occur.

2.

*ACTION*

*DATE/TIME: YYMMDD HH:MM:SS*

*CONTROL: DEVICENAME*

*KEY: KEYNAME*

*REPEAT: REPEATNUMBER*

*DURATION: HH:MM:SS (Optional)*

where:

*ACTION* = SCHEDULE causes the event to be added to the master schedule.

or *ACTION* = REMOVE causes the event to be removed from the master schedule.

*YYMMDD HH:MM:SS* is Date/Time (YY = year, MM = month, DD = day of month, HH = hour, MM = min, SS=sec).

*DEVICENAME* is any valid device name (must match exactly) to which the scheduled command will be sent.

*KEYNAME* is the name (must match exactly) of the Control Set button to be simulated.

*REPEATNUMBER* is number of times (9 max) that the IR control signal will be repeated.

*HH:MM:SS* specifies the duration of the command. This entry is used to determine if the scheduled event is obsolete, and so should not be executed. Normally *DURATION:* is unimportant and is used only if the BUFMC program was stopped for a period of time, during which scheduled events would otherwise have occurred, and then restarted. The events would then be (belatedly) executed only if the current time and date still fall before the *DATE/TIME: + the DURATION:*. If zeros (00:00:00) are used for the duration or it is omitted, the default duration of 00:01:00 is used, meaning that events will be executed only if they are less than 1 minute old.

3.

*ACTION*

*DATE/TIME: YYMMDD HH:MM:SS*

*SALVO: SALVOFILE*

*DURATION: HH:MM:SS (Optional)*

where:

*ACTION* = SCHEDULE causes the event to be added to the master schedule.

or *ACTION* = REMOVE causes the event to be removed from the master schedule.

*YYMMDD HH:MM:SS* is Date/Time (YY = year, MM = month, DD = day of month, HH = hour, MM = min, SS=sec).

*SALVOFILE* is any valid salvo filename (must match exactly) which is to be executed at the scheduled time.

The salvofile may have routes and/or control commands stored in it (see RECORDING A SALVO).

*HH:MM:SS* specifies the duration of the command. This entry is used to determine if the scheduled event is obsolete, and so should not be executed. Normally *DURATION:* is unimportant and is used only if the BUFMC program was stopped for a period of time, during which scheduled events would otherwise have occurred, and then restarted. The events would then be (belatedly) executed only if the current time and date still fall before the *DATE/TIME: + the DURATION:*. If zeros (00:00:00) are used for the duration or it is omitted, the default duration of 00:01:00 is used, meaning that events will be executed only if they are less than 1 minute old.

When scheduled events are added or removed, or when they are executed, two special files are updated. They cannot be opened when the BUFMC program is running, however they may be copied so they can be view

and/or used. The files are MSched.txt and MSchedD.txt for "Master Schedule" and "Master Schedule sorted by Destination". All scheduled events are listed in chronological order (the sorted by destination file lists all events for each destination together) and in the same format as above. Events may be removed by copying either file, replacing SCHEDULE keywords with REMOVE, then saving the file as Sched?.txt. Changes can be checked by referring to either of the master schedule files. These files are also used to restore scheduled events when the program is restarted.

## LOGGING

The logging option creates files that list all routing changes as they occur, and list all connections every hour. Once the logging option has been installed, a new folder is created for log files. The default folder location with respect to where you have installed the program (usually C:\BUFMC) is "logs" (C:\BUFMC\logs). The location for log files may be moved by changing the appropriate entry in the BUFMC.ini file.

Every day, a new folder is created within the logs folder named in the form YYMMDD. YY = year, MM = month, DD = day of month. The log files for each day will be created and stored in its folder.

All connections that are in effect after the first minute of each hour are stored in a file named in the form: LOGA-YYMMDD-HH.txt (HH being the hour). The file is headed with the day of week, date and time. Although, normally LOGA file is created after the first minute, the entire router status may be read up to the minute by deleting or renaming the file for the current hour. This will cause the program to create a new report, which will show the creation time in the heading. The file will consist of any number of entries in the form:

```
DEST: DESTNAME
SOURCE: SOURCENAME1 LEVELS: LEVELS
SOURCE: SOURCENAME2 LEVELS: OTHER LEVELS
ERRORS
```

Where:

*DESTNAME* is the name of the destination device that has had its inputs changed.

*SOURCENAME1* is the name of the source device that is connected to inputs of the destination on levels listed after the LEVELS: keyword. (ALL) is added to the end of the levels list if SOURCE: is connected to all DEST: inputs.

*SOURCENAME2* is one or more lines of additional connected devices, listed with the levels that are connected to the destination in the event there is a breakaway route. When the destination has inputs on levels that do not exist on the source device, there is a likelihood that other levels will be connected to the BLACK source.

*ERRORS* lists any router interfaces that may not be reporting. This generally indicates a router interface or wiring fault that must be corrected before routes and/or log reports can be made on the affected levels. The error report is in the following format:

```
No report ERROR - Router 'ROUTERNAME' - LEVELS: LEVELS
```

Where:

*ROUTERNAME* is the name of the router interface that is not communicating.

*LEVELS* is a list of levels associated with the router.

As connection changes are detected, a LOGC file is also created and updated. The LOGC file is similar to the LOGA, but with some differences. The LOGC file lists only changed status along with separate day of week, date and time entries for each group of detected changes. Each entry has an additional OLD SOURCE: entry that specifies which source was connected before the change was detected for each group of levels.

Change times are listed for:

Routing changes detected: Shows the day of week, date and time the changes were detected.

Previous status last valid: Shows when the last time the Old Source was known to be valid.

Therefore, although the exact time that the logged routes took place cannot be known, it is assured that the route actually occurred between the Previous status last valid and Routing changes detected times.

A new LOGC file is created every hour (assuming any logging changes occur). LOGC files cannot be opened during the hour they are used, but can be copied for viewing or use.

Log entries are made only when all status has been retrieved from all router interfaces and the interface box connected to the workstation used for logging. Therefore, several minutes may elapse before logging will occur after starting up the BUFMC program and/or resetting any interface boxes. Only BUFBOX user stations (ones equipped with an interface box vs. Network user stations) can be used for logging.



## MAINTENANCE

No routine maintenance of the BUFMC system is required. The following information is provided to give the engineer a thorough understanding of the system's operation and troubleshooting procedures.

Please feel free to call the factory for advice on solving any problems you may encounter.

## PHYSICAL

The system uses IFD-422 and IFD-422M protocol translation interfaces (BUFBOX) to perform the necessary data exchange and protocol translation between user station computers and router matrix frames. A simple and robust time-slice scheme is used for BUFBOX intercommunication, which uses a proprietary network called "BUFNET". Each IFD-422M computer interface BUFBOX connects to a PC via RS-232. Each router interface BUFBOX connects to a router frame via RS-422 or RS-232, depending on the router. Data rate, format, and protocol (including checksum error detection), depends on the router. Additional computers may be licensed to communicate with IFD-422 equipped computers via Ethernet.

The main board within the BUFBOX is the CPU board. This board is identical in all BUFBOXes except for the EPROM and the position of the channel 'B' BAUD rate jumper. The BAUD rate jumper selects Low (600, 1200, 2400 BAUD), Medium (4800, 9600, 19.2K BAUD), or High (38.4K, 76.8K, 153.6K BAUD) rate. The rate used within a range is set in firmware (in the EPROM program). The BUFBOX also contains one of two types of interface board, one for RS-422 (IFD-422's connected to RS-422 routers only), the other for RS-232. Both interface boards have a male and a female XLR-3 connector to connect to the "BUFNET" network (they are wired in parallel and either or both can be used).

Each IFD-422M computer interface BUFBOX EPROM is programmed with a unique identification number that is identical to the serial number on the label. All serial numbers are listed in the BUFMC\CONFIG\BUFIDS file and are used by the BUFMC software to control when the BUFBOX is allowed to talk on the BUFNET. The same EPROM code must not be used in more than one BUFBOX in a system or unreliable operation will result. The DB-9F female connector connects to a DB-9M male RS-232 connector (9-pin-D) using a pin-for-pin cable. Only pins 5 (GND), 2 (IFD TX), and 3 (IFD RX) are used. If the computer's com port is a DB-25M (25-pin-D), Connect IFD 5, 2, 3 to the DB-25 7, 3, 2, respectively.

Each IFD-422 router interface BUFBOX EPROM contains program code that is specific to the router's protocol and configuration, and also a unique timeslice number which controls when it is allowed to talk on the BUFNET. Connection to the router varies depending on make and cabling is provided with the system.

## INTERCOMMUNICATION

Communication between BUFBOX interfaces uses a modified form of the RS-485 electrical communication standard called BUFNET. This network utilizes standard Belden 8451 or equivalent shielded balanced audio cabling and XLR-3 connectors to provide the physical interconnection. No termination is used, allowing up to 256 devices to be placed on the network, with a total cable length of 1000 meters. Any network wiring topology may be used including star, daisy-chain, or a combination of both.

A simple and streamlined time-slice method is used to coordinate BUFBOX communications on the BUFNET. Intercommunication occurs at 38.4K BAUD, 8 bits, no parity, 1 stop bit. Messages are checksum protected. Each box is designated a slice of time in which to acquire the line for transmit purposes that is a fixed delay of time per slice from any lower numbered slice message. Since a router interface must be in the system for any routing to occur, they are assigned the lowest numbered time slices, and therefore control communication timing. This method allows continued operation even when some interfaces are taken offline for any reason. The overall loop time for all time slices is approximately 100 milliseconds, during which all boxes may send messages. Messages do not exceed 9 characters or 2.4 milliseconds. Each BUFBOX is equipped with a hardware circuit which resets its microprocessor if the BUFNET is acquired longer than allowed. A watchdog hardware circuit resets a BUFBOX in the event of a microprocessor lockup.

## COMPUTER COMMUNICATION

A computer interface BUFBOX communicates with its respective PC via any RS-232 serial port. Messages are checksum protected and are interchanged at 38.4K BAUD, 8 bits, no parity, and 1 stop bit. Status for all routers and levels are maintained in each BUFBOX. When the BUFMC software is run, it requests the status of all router levels and destinations and updates the screen accordingly. After this process is finished, only status changes are requested, which allow quick screen updates of routes that occur with minimal PC overhead.

When a take is requested by the user, a take request is sent to the BUFBOX, which contains the logical level number, the number of consecutive levels to take, the physical destination, and the physical source. The BUFBOX converts the logical level(s) into router number(s) and router level(s) using information downloaded into it by the BUFMC software. This router configuration is stored in the BUFMC\CONFIG\STATS file. The destination and source of a take are converted into physical inputs and outputs in the BUFMC program. The take message is checksum protected to avoid inadvertent switching in the event of random noise received by the BUFBOX which could occur due to cable disconnection, static discharge or other interference or power disturbances. The BUFBOX converts this message to the BUFNET intercommunication protocol and in turn sends commands to the respective router interfaces.

## ROUTER COMMUNICATION

Various communication speeds, formats, and protocols are used to control the routing switchers that exist in the system. Manufacturers each use their own communication scheme, and different methods are often used by the same manufacturer for different models. The primary purpose of the router interface BUFBOX is to translate between the particular router frame's communications scheme and the BUFNET router intercommunication protocol. This protocol provides a consistent vehicle for router control, and incorporates checksum protection to prevent unintentional router switching when random noise occurs on the BUFNET line.

## INTERCHANGEABILITY

Since all BUFBOXes in the system are identical (with the exception of RS-422 router interfaces), any less critical BUFBOX can be switched with an important one in the event of a failure. If an IR-422M computer interface on a critical station fails, it can be substituted with any other less critical computer interface. You may need to reboot the BUFMC program. If an RS-232 type IR-422 router interface fails, it can be substituted with a less important IR-422M computer interface. Change the EPROM in the replacement BUFBOX with the one from the failed unit. Make sure not to bend pins and do not insert the EPROM backwards or it will be destroyed. Also, make sure the BAUD B jumper is the same as in the failed BUFBOX.

## TROUBLESHOOTING

First, you must identify the scope of the failure. Is the whole system down, or just part of it? Are one or more user stations down (not controlling the routers), or all of them? Are one or more routers failing to operate but others working OK?

Problem is with one or more user stations, but others work.

COMM STATUS button on BUFMC screen (upper right button) says ON LINE:

1. If SALVO button is lit, you are recording routes offline. Route requests are not sent to the routers when recording salvos. Hit the SALVO button and CANCEL.
2. Levels may be disabled. Only levels that are enabled will route. If all levels in common between devices being routed are disabled, no route will take place. Press LEVELS and hit levels to enable them (level icons are dark when enabled).
3. There may be no levels in common between the source and destination being routed. Available levels are shown to the right of sources and to the left of destinations. Check to make sure the same color/position appears on at least one level of both devices.

There may be a problem with the BUFNET communications to the user station:

1. Check the BUFNET system and router interfaces for operation by hitting the COMM STATUS (ON LINE) button. The communications menu comes up and the last buttons are router interface status buttons. Router

interface buttons show dark for working interfaces. If they show light, there is a problem with the router interfaces or the BUFNET connection to them.

2. Test a minimal system by unplugging the BUFNET connectors from the suspect computer interface and a known working router's IFD-422. Using a known good audio wire, connect the two boxes together and see if you can make a route on that router. If so, there is a problem with the BUFNET wiring.
3. Try another IFD-422M BUFBOX from a known working user station.
4. Using an oscilloscope, check for activity on both pins 2 and 3 of the unused XLR connector on the IFD-422. You should see approximately +2.5V most of the time with small packets of data that swing from about +1 to +4 volts. Adjust the time base, trigger holdoff, and trigger level to make these packets stationary. When you attempt a route from BUFMC, you should see extra packets appear momentarily which are the route commands.

COMM STATUS button on BUFMC screen (upper right button) says OFF LINE:

1. Station is operating in demonstration mode. Click on COMM STATUS button and choose the appropriate communications port. See the INSTALLATION section for more information.

COMM STATUS button on BUFMC screen (upper right button) says NO COMM:

BUFMC is not communicating with the IFD-422 BUFBOX.

1. Exit the BUFMC program. Reboot the IFD-422 interface by disconnecting its white power connector and reinserting. Run the BUFMC program. Enter the Engineering mode (click on ENG button and enter 4-4-4-4 password - it should turn red). Press the COMM STATUS button. The second to last button shows the communications status. If it says Unlicensed, call the factory for instructions. If it goes through several stages ending with BUFBOX OK, the COMM STATUS button should say ON LINE, and the unit should operate properly. Continue to the next step if the second to last button still says NO RESPONSE (and the COMM STATUS says NO COMM).
2. Check the connection between the IFD-422 and the computer RS-232 port. Try a different cable and make sure the correct port is connected. To change the port, hit the COMM STATUS button, select DEMO MODE, hit COMM STATUS again, and select the appropriate port.
3. Verify that 10-18VDC is getting to the IFD-422M power connector by inserting the probes of a voltmeter into the rear of the white power connector while it is still connected to the interface. Disconnect the power connector and make sure that the power pins have not receded into the housing such that connection is not made.
4. Test the computer's RS-232 port as follows: Disconnect the wire from the IFD-422M. Run HyperTerminal (included as an accessory with the computer's operating system). It can usually be found by hitting Start, Programs, Accessories, Communications, HyperTerminal. If you get a New Connection window, hit Cancel. Under the File menu, select Properties, change Connect Using to Direct to ComX (where X is the com port you are using). Hit the Configure button and set Bits per second to 38400, Data bits to 8, Parity to None, Stop bits to 1, Flow control to None, and hit OK. Hit OK again to close the Properties window. Short pins 2 and 3 of the 9-pin-D connector together and check if anything you type in HyperTerminal shows in the screen. Then stop shorting the pins and verify that typed characters do not show on the screen. If either of these do not occur, you have a problem with the computer's communications port or the wire.
5. Try another IFD-422M BUFBOX from a known working user station.

One or more routers unresponsive, but others working:

Problem is with IFD-422 router interface box on the affected router, its power supply or AC power to it, the BUFNET connection to the IFD-422, the connection to the router, or the router itself.

1. Check the BUFNET system and router interfaces for operation by hitting the COMM STATUS (ON LINE) button. The communications menu comes up and the last buttons are router interface status buttons. Router interface buttons show dark for working interfaces. If they show light, there is a problem with the router

interfaces or the BUFNET connection to them. If problem routers show dark but routes don't work, there is a problem with the router itself, the IFD-422, or the wiring between the router and IFD-422.

2. Try rebooting the IFD-422 router interface connected to the router. Unplug the white power connector and reconnect. Because the entire router status will have to be relearned, don't expect an attempted route to show on the BUFMC screen quickly (it can take several minutes after a reboot), instead, monitor a known router output or control panel to see if a route takes place.
3. Verify that 10-18VDC is getting to the IFD-422 power connector by inserting the probes of a voltmeter into the rear of the white power connector while it is still connected to the interface.
4. Check the connection from the IFD-422 to the router.
5. Check the connection of the BUFNET XLR cabling.
6. Test a minimal system by unplugging the BUFNET connectors from the suspect router interface and a known working user station's IFD-422M. Using a known good audio wire, connect the two boxes together and see if you can make a route (see #1 for testing routes). If so, there is a problem with the BUFNET wiring.
7. Disconnect the wire from the router and, using an oscilloscope, check if there is activity on the TX pins from the IFD-422. RS-232 should be on one pin with a swing of at least -5 to +5 volts. RS-422 should be on two pins, both with a swing of at least +1 to +4 volts.
8. If you have another way to control the router (terminal interface, etc.), try it and see if you can control that way. If not, it may be necessary to reboot or repair the router.
9. If you have eliminated all other possibilities, try swapping the IFD-422 with a less important IFD-422M (RS-232 IFD-422 only). Swap the EPROMs, taking care not to bend pins or install backwards. Also, swap the orientation of the BAUD B jumper. If the router interface works as a computer interface, you have eliminated it as a suspect. If not, and the computer interface works as a router interface, the fault lies with the IFD-422.