Uptown™ Automation
System 2000 Installation and Technical Reference Manual

For use with

Fader Driver Board #800, Opto Isolated, EEPROM

Notice: Please read the warranty, technical support and disclaimer policies in Appendix A prior to unpacking or installing your Uptown automation system. Unpacking or installing the system will signify your acceptance of the terms and conditions.

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Chapter 1

Introduction

This Uptown Automation System 2000 installation manual is provided to help assure simple, efficient, correct installation and to serve as a technical reference guide describing the functional operation of the entire system.

This manual is organized into the following chapters:

- **Introduction:**
  quick overview of the System 2000 installation
- **Pre-installation planning:**
  issues to be resolved before installation
- **Hardware reference guide:**
  detailed technical discussion of how the system works
- **Installation:**
  instructions for system hardware and software installation
- **System testing:**
  verification that the system is performing properly
- **Troubleshooting:**
  a guide to solving system problems

System Hardware Overview

The Uptown Automation System 2000 is composed of the following major hardware components:

- Motorized fader modules
- IBM AT compatible computer
- Computer plug-in boards
- Power supply.

These major components are interconnected using the following types of wiring:

- Fader bank bus
- Fader bank links
- Power distribution cables

- Digital data bus cables

Due to console peculiarities, such as bulkheads and partitions inside of the console, it may be necessary to fabricate some or all of the system wiring during the actual installation. In general, if the System 2000 checklist is properly filled in, we can manufacture the proper cables to suit your specific needs.

Each group of 8 adjacent, interconnected faders is called a bank. Each of the individual fader modules in such a bank is connected to all of the other modules of the bank by a seven-wire bank bus ribbon cable. Each bank receives one power distribution cable and one digital data bus cable.

In our standard system, the power distribution cables may be up to 12 meters (40 feet) long and the digital data bus cable may be up to 4.5 meters (15 feet) long. In both cases, it is recommended that the wiring be as short as possible. It is possible to extend the power cables by using a larger wire gauge between the power supply and the console. Also, we offer optional data extenders which utilize shielded data cables up to 30 meters (100 feet) long.

The illustrations in this manual are designed for the wiring to enter the console at the left side of the console (your left as you face the console). This orientation is identified on the data cable package, which in this case would be marked LEFT. If your data cable package is marked RIGHT, the wiring is intended to enter the right side of the console.

Optical switch wiring

A powerful feature of the Uptown Automation system is the availability of four optically isolated automated switches. These switches may be used to activate console mutes and other switches, and to trigger external devices. The fader module does not have an audio mute circuit, so the existing console mute circuitry is utilized.

The optical switch wiring is generally non-critical and may be 10 or more feet long, depending upon the characteristics of the device to be switched.

Due to the wide variety of console designs and the fact that it is quite common for console manufacturers to change the design of the mute circuitry, connectors, component values, component locations and connector locations, it is not practical for Uptown to provide mute wiring. We do, however, provide schematic diagrams that illustrate mute circuitry which has been reported to perform properly. You may have to consult the manufacturer of your console for further recommendations concerning the wiring of mutes or other switch functions.

Fader audio wiring

Each fader is provided with a 4 pin audio connector. Due to the wide variety of console connector types, wiring locations and connector locations, the audio wiring and/or connector installation is performed during system installation. In some cases, Uptown can provide pre-assembled fader audio cables.

Installation Overview

Installation of a typical 40 channel System 2000 may be completed in about 8 to 16 man-hours using the pre-assembled wiring kit, not including mute wiring. If the console is difficult to wire due to metal partitions or other obstructions between fader modules, the basic installation could require as many as 20 to 40 man-hours.

For some automation-ready systems, the mute wiring will add only an hour or two to the installation. For difficult cases, some additional mute circuitry may have to be designed and built, and mute installation may require an additional 20 hours or more.

Computer Overview

We prefer to include a fully setup computer with the System 2000. However, in special cases, customers may elect to provide their own computer and do their own setup and testing. Due to the expertise required to properly setup the computer, it is generally most cost effective for you to use our computer or send your computer to us for setup

Normally, as a service, we purchase a computer for you, install the MIX software, MIDI board and I/O boards, test, and ship your computer with the system. When we install our circuit boards and our software in the computer, we can verify that the computer and its accessories are fully compatible with our system. This service will simplify your installation and may save you quite a bit of time and is included in our suggested resale prices.

General Computer Specifications

The automation system computer needs to meet the following minimum specifications:

- IBM AT 386 (DX) or 486 (DX or SX) compatible computer, 33 MHz, 64K cache
- hard disk
- 5 1/4", 1.2 meg floppy disk or 3 1/2", 1.44 meg floppy disk
- VGA (or EGA) graphics adapter
- VGA (or EGA) monitor, color or monochrome
- serial mouse or trackball (we recommend the 3-button Logitech mouse and trackball)
- at least 1 megabyte of LIM 4.0 expanded memory.

The 386 DX 33 Mhz processor should be adequate for systems of up to 64 automated fader modules. For more than 64 fader modules, the 486 SX or DX 25 Mhz will be required. A 386 SX is not adequate for any size system.

We recommend using a VGA adapter and monitor since they provide the sharpest, clearest display. An EGA system also provides good results, but is not quite as sharp and clear.

The choice of mouse versus trackball is purely a matter of personal preference. The major advantage of the trackball is that it occupies a fixed location and doesn't have to be moved on a special mouse pad, and it can be operated easily on a sloping surface. In either case, it must be a serial device and should be installed on COM1. A bus mouse will not work properly with our system.

The amount of expanded memory available determines how many automation moves can be recorded during a mix. We recommend starting with 4 megabytes of RAM for most installations, or 8 megabytes if you plan on doing extremely long and complex mixes. If your particular usage of the system shows that you need more memory, then you can add more memory as required.

I/O Cards

One Uptown I/O card must be installed in the computer for each four banks of faders (up to 32 faders) in the automation system. That is, a system having 1 to 32 automated faders would require only one I/O card. A system of 33 to 64 automated faders requires two I/O cards. A system of 65 to 96 automated faders requires three I/O cards.

Each I/O card must have the System Information and Address jumpers set during installation.

A data cable connects each bank of faders to the I/O card. Three conductors of the data cable are required to carry the data to each bank of faders.

MIDI/SMPTE Card

One MIDI/SMPTE co-processor card must be installed. The switches on the card must be set during installation.

Power Supply

Each rack mounted power supply is designed to provide power for up to 40 of the System 2000 motorized faders when the system is operated on 60 Hz mains AC. (For use on 50 Hz AC mains, the power supply must be derated to 36 channels maximum per power supply.) Each bank of 8 modules has a 6 mm (1/4") diameter, shielded cable running from the power supply to the fader module. The maximum recommended distance from the power supply to the fader modules is 12 meters (40 feet) when using #22 AWG wiring.

Chapter 2

Pre-installation Planning

Planning

Planning the installation of your Uptown Automation system can greatly simplify the installation process and considerably reduce your studio downtime.

Please read the warranty, disclaimer and return policies in Appendix A before unpacking or installing the automation system.

Components

There are three types of components which may be required for installation of the System 2000. First, there are the standard components which are essentially the same for all installations. Secondly, there are optional components which may be desirable for some installations. Finally, there may be special components which are necessary to allow the System 2000 to be installed in a certain type of console.

Installing the Uptown Automation System 2000 involves the following major standard components:

- Motorized fader modules
- IBM AT compatible computer system
- Power supply
- System wiring

In some installations, the following optional components may be useful:

- Control Panel
- Electronic mute/VCA make-up amplifier circuit boards
- Data cable extenders

In most cases, no special components will be required to complete the installation. However, the one critical area which deserves careful consideration in order to determine any special requirements for a specific console:

- Mute operation

Since the mutes vary so much from console to console, there is no way for us to offer standard solutions to this very important issue. Therefore, the mute wiring generally requires the most attention during the planning of the installation.

For each installation, the operation of the mute circuitry should be carefully investigated to assure that there are no surprises during installation. (In order to prevent any need for rework, we recommend that one channel of automation be fully tested for fader operation and mute operation prior to automating the rest of the console.)

The automation system is able to control four switch functions on the console from each of the fader modules using opto-isolators. One of the optos is normally used to control the channel mute, leaving three optos available for other functions, such as EQ on/off, channel insert, or a mute that is not on the channel, such as an echo return mute, or a mute on the monitor side of the console.

Technical specifications for the standard system components including fader module, fader dimensions, fader audio connections, typical mute wiring schematics, power supply wiring and data bus wiring are presented in Chapter 3, the technical reference section of this manual. From time to time, as you read the following descriptions, it may be helpful to look ahead to the technical reference section for additional information and illustrations.

Fader Modules

The fader module metalwork is designed specifically to fit in each type of console. As part of the ordering process, you may select painted finishes in most any color or anodized panels which are more durable and are also more costly.

All of our System 2000 fader modules use the same size electronic circuit board, but depending upon your specific needs, we have several types of faders and any required type of metalwork to suit your specific needs.

Wiring

One module in each fader bank connects to a four-conductor shielded power cable, about 6 mm (1/4") diameter. The power cable originates at the barrier strip on the back of the power supply and plugs into the 4-conductor power connector on the fader module circuit board. The power cables normally supplied are shielded #22 AWG cables, 12 meters (40 feet) long.

The data cable which carries the automation system data between the computer and each fader bank is normally a #22 AWG ribbon cable, 4.5 meters (15 feet) long, using three conductors for each fader bank. For example, the data cable for a 32 channel system is a 12-conductor ribbon cable, about 2 mm (.080") thick and 30 mm (1.2") wide

For consoles with individual fader panels, the power and data cables to the system are most easily installed from beneath the console. Many consoles have a removable bottom panel located beneath the faders which simplifies installation. If your console does not have a removable bottom, the console may require modification prior to the automation system installation.

Mutes

The System 2000 fader module contains all of the logic to provide mute automation. Due to the wide variety of consoles and the preferences concerning mute circuit technology, our systems are designed to utilize the existing mute circuitry in the console. There is no audio mute circuitry in our fader module.

In consoles which are automation ready, such as the DDA DMR12 or Trident Series 90 for example, our opto-isolated mute interface is fully compatible and installation is quite simple. Some consoles which are designed to be compatible with VCA automation, such as Sony MXP-3000 series, require a gain make-up amplifier if the VCA circuitry is removed. If you desire to retain the VCA circuitry, we can supply motorized VCA faders. If the console does not have electronic mutes, then some sort of electronic mute such as the PMI SSM2402, a reed relay or FETs must be installed.

The automation system software provides a mute Invert function, available from the keyboard or control panel, which will cause each of the mute buttons to turn channels on rather than off, thus performing a solo-in-place function.

Computer

For the computer, the major planning issues involve placement of the computer, computer monitor, keyboard, trackball (or mouse) and the automation data bus. The automation data bus has a maximum length of 4.5 meters (15 feet) from the back of the computer to the farthest fader module. The automation data bus wiring should be kept as far as possible from any audio wiring (at least 2 or 3 inches).

The computer monitor is a possible source of audio noise and should be kept at least a foot or two away from any high level audio wiring, including patch bays.

The trackball will be used more often than the keyboard and should be placed close by for easy access.

Control Panel

The System 2000 has provisions for a system control panel. The model CP-2 control panel (order #986) provides 24 push-button switches and a four line backlighted LCD display. A theater control panel, (order #875) model CP-3 is designed specifically for live theatre applications.

In the CP-2 control panel, two of the control panel switches perform keyboard macros and can be programmed to perform any function which you could perform at the keyboard. For example, one of the user programmable buttons might be used to invert the function of the mute switches, thereby providing a solo-in-place function.

Power Supply

You need to decide where to put the power supply and how to route the power wiring. The Uptown Automation system provides a rack-mounted power supply for each 40 channels of automation (36 channels when operating on 50 Hz Ac mains). The power supply is 7 inches (4 rack units) tall, 14 inches deep and mounts in a full width 19 inch rack. The power supply has a low noise fan (23 dBA) which blows air out the back of the supply.

Each bank of eight fader modules is connected to the power supply by a shielded 4-conductor cable, about 6mm (1/4 inch) diameter. See Chapter 3, Hardware

Reference Guide, Power Supply, for a complete description of the power supply, power cables and connectors.

Questions to Answer

The following list summarizes a number of decisions that need to be made prior to installation. Your sales representative should be able to help you with these important decisions.

1. **Is the console bottom (beneath the faders) removable? If not, how can the bottom be removed?**
2. **Is any additional interface circuitry required for the opto isolated mutes?**
3. **Will other switch functions be automated with the opto isolators?**
4. **Where will the computer, monitor, and keyboard be located?**
5. **Where will the automation data bus cable enter the console?**
6. **Where will the rack-mounted power supply be mounted?**
7. **Where will the power cables from the Uptown power supply to the console be routed?**
8. **Where will the power cables enter the console?**

Finally, prior to installation, check with Uptown Technical Support (phone us toll - free at (800) 343-3237) for any new, updated or changed information which may be useful in your installation.

Chapter 3

Hardware Reference Guide

Introduction

This chapter describes in detail the hardware components of the system. You should read this section thoroughly to become familiar with the system hardware before going on to the actual installation. Then you can refer back to this section while reading the Installation chapter for specific information about your installation.

The hardware reference section will present the following topics:

- **System Wiring Overview**
  - Major components
  - Wiring overview
- **Fader Modules**
  - Fader module dimensions
  - Fader bay depth requirements
  - Power requirements
  - Fader module connectors
  - Module interconnection
  - Fader bank extension
  - Power-on reset
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  - Tension adjustments
- **Fader Cleaning**
  - Cleaning and lubrication

- **I/O Boards**
  - I/O board jumpers
  - Data connectors
- **Data Bus Wiring**
  - Routing
  - Construction
  - Direction
- **MIDI/SMPTE Board**
  - Address
  - Interrupt
  - Time code wiring
- **System 2000 Improvements**
- **Power Supplies and Power Wiring**
  - Dimensions
  - Line voltage selector and fuses
  - Wiring
- **Software Versions**
  - Version control

System Wiring Overview

Each fader bank of the System 2000 is designed to have 8 motorized faders, but in special cases the system can operate a maximum of 9 faders per bank. Each fader bank receives one power distribution cable and one digital data bus cable. The 22 AWG power distribution cables may be up to 12 meters (40 feet) long. The digital data bus cable may be up to 5 meters (17 feet) long. In both cases, it is recommended that the wiring be kept as short as possible.

The overall system wiring is really quite simple, as shown in the following illustration of a 32 channel system which has 4 fader banks.

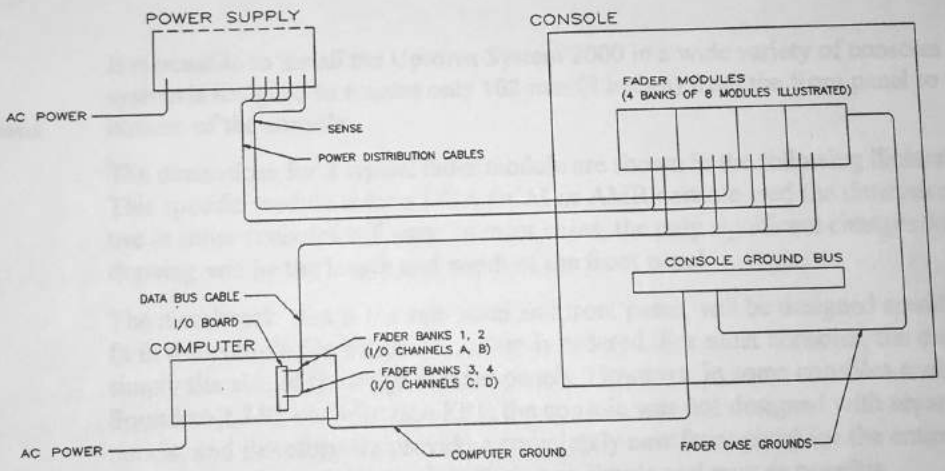


Figure 1 - Overall System Wiring

Please note that the console chassis star ground point is generally used as the ground reference for the computer case and the cases of each of the faders. For proper operation of the touch sensors in the faders, it is very important that the system is properly connected to the console chassis.

In some consoles, the grounding scheme illustrated here may need to be modified due to ground loops such as those created by outboard gear and/or patch panel wiring. Some trial and error testing may be required to determine the optimum

ground wiring scheme, but the wiring shown here should be a good starting point. Properly installed, the Uptown automation system will not affect the console noise floor in any measurable way.

console chassis ground

Ordinarily, the automation system uses the case of the computer as the ground reference for the system. In most instances, the case of the computer is tied to the third wire ground in the 3 pin IEC AC mains power connector. If the console chassis is tied to the same ground as the third wire ground of the outlet that the computer is plugged into, then the grounding should be fine without any additional ground wiring to the computer.

The outputs of the Uptown power supply are fully floating and will be connected to console chassis ground via the computer chassis. When connecting the computer case to the console chassis, the third wire of the computer line cord is normally disconnected to avoid ground loops and then the safety ground for the computer is supplied by the console chassis ground. The safety ground wiring must meet all local electrical codes and regulations. If you are uncertain of the requirements, you should consult with a properly licensed or registered electrician.

Pin 4 of the audio connector on each fader should be connected to console ground in order to allow any fader motor noise currents to be returned to our power supply and not be injected into the audio ground system.

Fader Module

Fader Module

This section will describe the physical size of the System 2000 fader module, illustrate the fader module wiring and describe the addition of a ninth module to a bank.

Each fader module is constructed of four major components:

- Electronic circuit board (called the fader driver board)
- Motorized fader
- "L" shaped bracket (sub-panel)
- Front panel (fascia)

Fader Module Dimensions

It is possible to install the Uptown System 2000 in a wide variety of consoles. The system is designed to require only 102 mm (4 inches) from the front panel to the bottom of the console.

The dimensions for a typical fader module are shown in the following illustration. This specific module is for a DDA DCM or AMR console, and the dimensions for use in other consoles will vary. In most cases, the only significant changes from this drawing will be the length and width of the front panel.

The metalwork, that is the sub-panel and front panel, will be designed specifically to fit in the console for which the system is ordered. For most consoles, the modules are simply the size of the original fader panels. However, in some consoles such as Soundcraft TS24 or Harrison PP1, the console was not designed with separate fader panels, and therefore we provide a completely new front panel for the entire audio channel in order to keep the installation as simple and neat as possible.

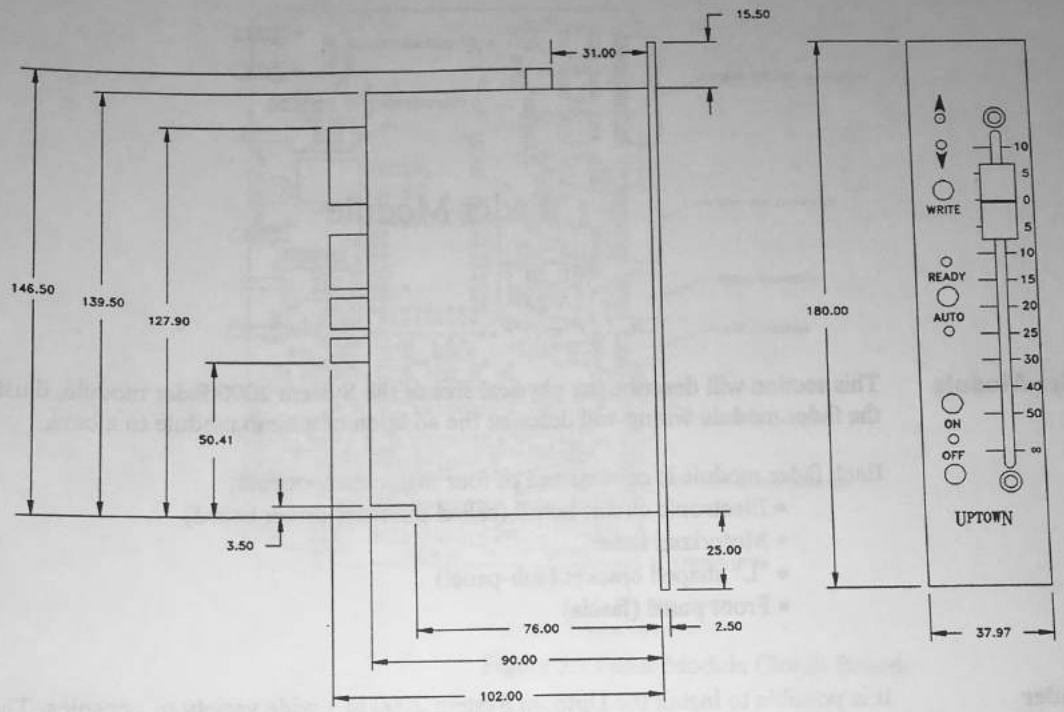


Figure 2 - Typical Fader Module Dimensions

Power Requirements

Each fader module requires 5 V DC to power the on-board microprocessor, logic and LEDs. Typical current from the 5 volt supply is about 35 mA per module, with a maximum current of 60 mA.

Additionally, each fader module requires 24 V DC which powers the fader motor and the op amps. Typical current is about 35 mA when the fader is not moving, about 150 mA when the fader is moving at moderate speed and a maximum of 300 mA when the fader is moving rapidly.

Circuit Board Connectors

The following illustration shows the System 2000 fader module and the locations of the connectors.

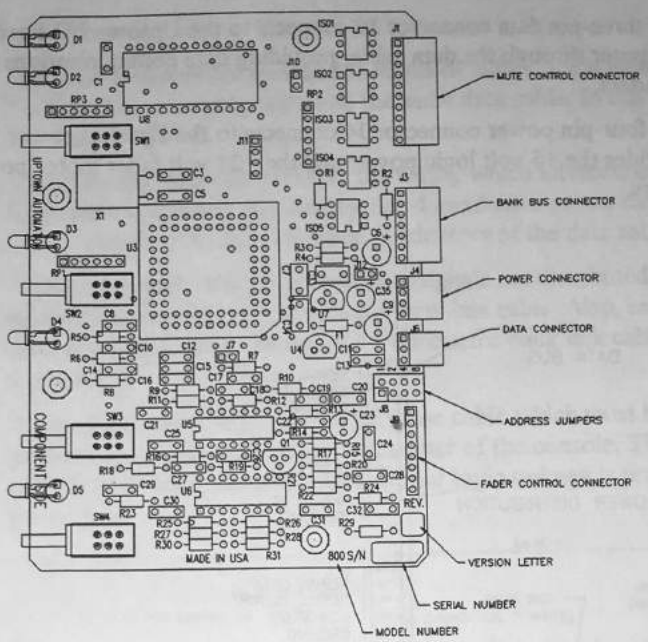


Figure 3 - Fader Module Circuit Board

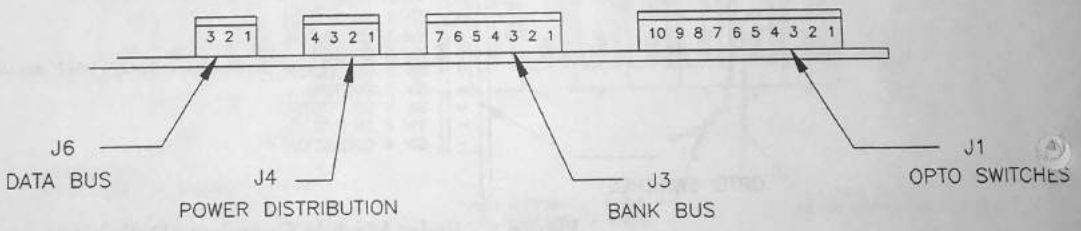


Figure 4 - Fader Module Connector Pin Numbering

Opto output connector J1 allows the board to send four opto-isolated control outputs to the console. Typically only switch 2 is used, to control the console mutes. Opto switch 2 is specifically intended for use with mutes and is therefore unique because of the grouping features included for mute operation. The other three opto switches could be used to control EQ in/out, AUX settings or any other switchable function.

Connector J3 serves as a bus connector which distributes power, ground and data to all the members of a bank of faders.

The three-pin data connector J6 connects to the Uptown I/O board in the system computer through the data cable, providing data communications for the entire bank of faders.

The four-pin power connector J4 connects to the Uptown power supply and provides the +5 volt logic power and the +24 volt fader motor power for the bank of faders.

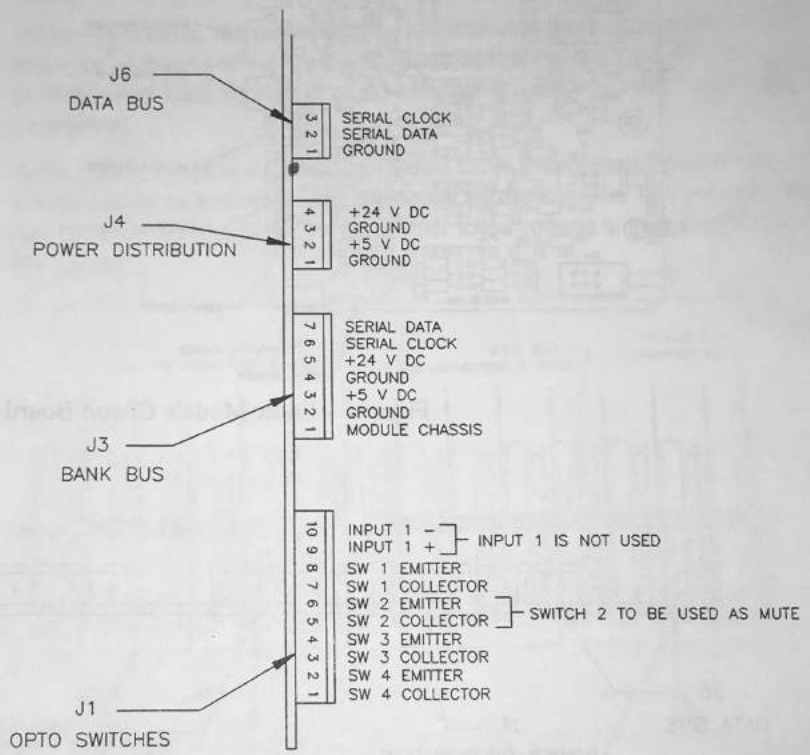


Figure 5 - Fader Module Connector Definitions

To protect the fader module circuit board from catastrophic damage, the 24 volt power to the motor driver stage is fused with a 1/2 amp LittleFuse Picofuse. If the fuse is blown, the motor driver output stage is probably damaged and the fader may also be damaged. If a fader module fuse is blown, the complete fader module, including the motorized fader, should be returned to Uptown for diagnosis and repair.

Fader Module Interconnect

The fader modules are arranged in banks of faders. Each bank of fader modules shares the same power supply cable and the same data cable. In this manner, the system wiring is greatly simplified.

The following illustration shows the wiring which interconnects the fader modules. Each bank has power supplied by one 4 conductor power cable from the power supply and receives data via three conductors of the data cable.

Within each bank, the power and data signals are distributed among the fader modules by means of a 7 conductor bank bus cable. Also, each bank is connected to each adjacent bank by means of a 3 conductor bank link cable (which has a 4 pin connector).

Additionally, there is a 5 volt logic sense cable which must be connected from the power supply to a module near the center of the console. The voltage sense cable and the bank links assure that the proper logic voltage is provided for each module in the system.

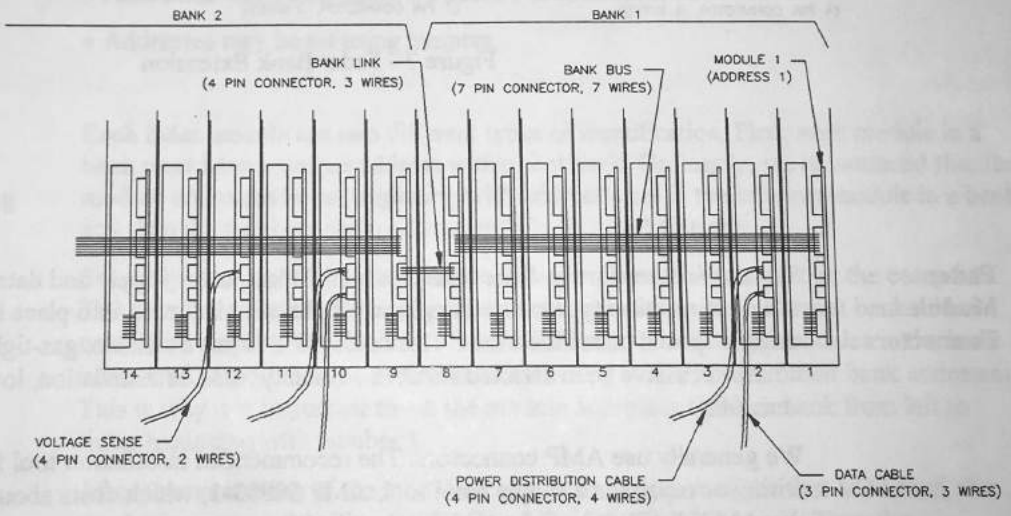


Figure 6 - Fader Bank Interconnections

Fader Bank Extensions

In some cases, it is desirable to add an additional module to an existing bank of faders or to have a member of a fader bank several inches away from the other members of the fader bank. For example, it might be desirable to add a stereo master fader that is several inches away from the other faders in the bank.

The following illustrations depicts the general approach to the extension of an existing fader bank. In this example, a ninth fader module is being added to a bank of 8 fader modules. Please note that although they have been omitted from this

illustration for clarity, there must be bank links installed to connect to the adjacent bank(s) of faders.

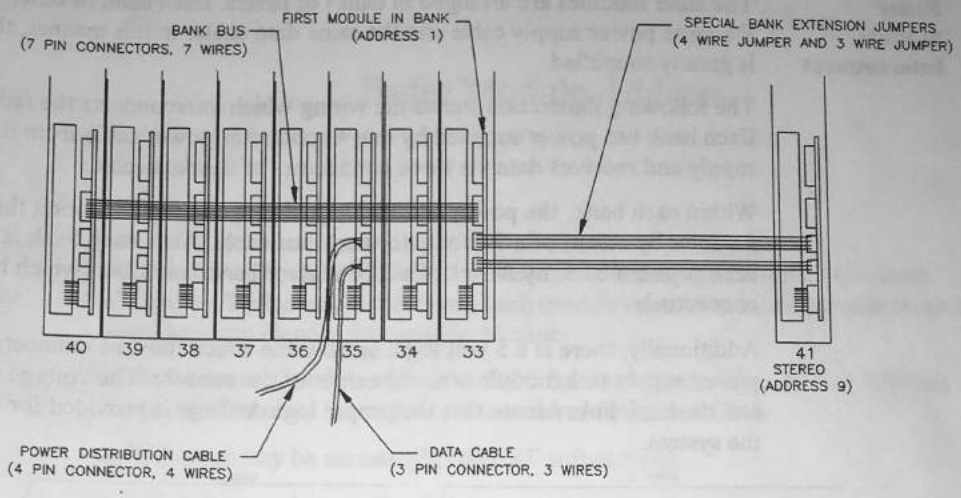


Figure 7 - Fader Bank Extension

Fader Module Connectors

The connectors for the fader bank bus bank links, power supply and data wiring are mass-termination type connectors in which the wire is forced into place in the housing using a special installation tool. This connection forms a reliable, gas-tight joint. These connectors have been selected for their reliability, ease of installation, low profile and versatility.

We generally use AMP connectors. The recommended installation tool for special wiring or repairs is a simple hand tool, AMP 59803-1, which costs about $15 from any AMP distributor, and may be ordered with the system.

Power-on Reset

Proper power-on reset of each fader module requires that the logic power supply drop below 1 volt when turned off, and that the logic supply risetime be on the order of 20 msec or less. Longer risetimes may result in erratic reset and operation.

To do a proper power-on reset of the automation system, turn off the power supply, wait for at least one minute, and turn the power back on.

Fader Module Address

Module Addressing

Each Uptown System 2000 fader module must communicate with the system computer. Within each fader bank, each module must have a unique address so that the computer can identify that specific module.

With the current models of System 2000 fader modules, there are two different methods which may be used to set the address of each module:

- Addresses may be set using SYSTEST software, or
- Addresses may be set using jumpers.

Fader Module Numbering

Each fader module has two different types of identification. First, each module in a bank must have a unique address within that bank. Ordinarily, we recommend that the module addresses be set beginning with address 1 set in the leftmost module in a bank and then the numbers assigned sequentially from left to right.

Secondly, each module in the system is assigned a module number by the computer. The computer begins numbering the system beginning with the lowest bank address connected to port A of the first I/O board. Then, the remaining modules in the bank connected to port A will be numbered according to the order of their bank addresses. This is why it is important to set the module addresses for each bank from left to right, beginning with number 1.

After the numbering of the modules connected to port A of the first I/O board, the numbering proceeds with ports B, C and D of the first I/O board. Then the numbering of the modules continues with the second and third I/O boards if applicable.

In general, the system will be easiest to use if the computer recognizes the fader modules as having the same numbering as is marked on the console. In some consoles there are grouper faders, wild faders or stereo master faders which are physically located in the midst of the input channels. In such a case, it is best to assure that the system wiring is performed in such a manner that the input channels are numbered correctly. After the input modules, the groupers or wild faders should come next, followed by the stereo master fader.

In this manner, the computer utilities such as the switch event editor will have the same channel numbering as the console. If the groupers and/or stereo master were to be assigned module numbers by the computer which appear to be input channel numbers, it would be very difficult to perform any off-line editing functions which require specification of a channel number.

Software Addressing

The fader module addresses may be easily set using the SYSTEST program. This method allows the addresses to be set, or reset, without removing the modules from the console.

We have found that it is generally more desirable to be able to view the module addresses using the front panel LEDs and then set, or reset, the module addresses using the SYSTEST program rather than using the jumpers which often require removing the module from the console to perform changes.

Since the address jumpers will override any software settings, make certain that there are no jumpers installed if you are using the software addressing.

See the SYSTEST documentation for complete description of setting the module addresses via software.

Jumper Addressing

While either addressing method will work, the jumper method was retained primarily in order to allow the new System 2000 modules to be more easily used in an older System 2000 installation.

On each fader module, there is an eight pin header which may be used to set the address of the module. If there are no jumpers, then the software address will be used. If there are any jumpers installed, they will over-ride any software setting.

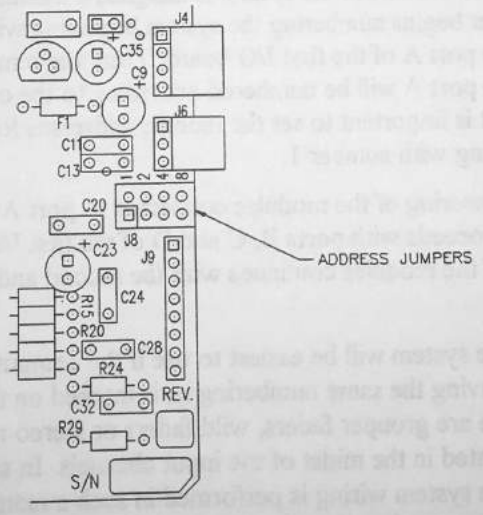


Figure 8 - Fader Module Address Jumpers

The address jumpers are set in an additive manner. To select address 1, put a jumper on across the two pins labeled '1'. To select address 2, put a jumper across the two pins labeled '2'. To select address 3, put on the jumpers for both 1 and 2.

Mute Switches and Mute Control

Mute Switches and Mute Control

Each Uptown System 2000 fader module has four opto isolated control outputs at connector J1. All four switch outputs use opto-isolators in order to simplify installation and assure that there are no ground loops which might cause noise problems. Typically, this switch automation capability will be used to automate the mute for each channel, but this capability could also be adapted for other uses such as automating EQ or insert selections.

Uses Existing Console Mute

The System 2000 does not provide any new mute circuitry for the console, but simply uses the existing mute circuitry in the console. In this manner, the mute performance of the console is not in any way altered. The System 2000 fader module provides the electronic interface to transmit a mute control signal to the console mute circuitry. In many consoles, the existing mute circuitry can be directly controlled by our opto-isolated mute control signals, but in some consoles it may be necessary to add some additional interface electronics to properly control the console mute. In some cases where there is no means to electronically mute the console, it may be necessary to add a new audio mute circuit to the console.

Switch Action

Each System 2000 fader module has two dedicated switches labeled ON and OFF to control the state of the opto isolated output switches. When the automation ON or OFF switch is pressed, the fader module processes the switch action and produces the appropriate opto output control signal which then goes to the console circuitry to control the audio.

The use of separate ON and OFF switches on the fader module is a very convenient method to allow full control of mute writing and subsequent over-writing. If only the issue of writing a mute is considered, then a single switch might seem simpler. However, when you begin to consider the actions required to edit a mute instruction which the automation system has recorded, it becomes obvious that it is very simple to have one switch for ON and an additional one for OFF.

Mute Accuracy

When the mute OFF or ON switch is pressed, the computer records that switch event as occurring at the end of the current quarter frame and the real-time switch action is delayed until the end of the current quarter frame to allow accurate repeatability of the switch event. The mute occurrence will be repeatable within 1 millisecond.

Mute Control

Each of the channel mutes is electronically controlled by an opto-isolator on the Uptown fader module. The following schematics are provided to illustrate typical mute interface concepts and are not warranted to be appropriate for any specific application. Uptown Automation will not be liable for any use, misuse, or patent coverage of these concepts.

Control Outputs

The four control outputs of the fader module on connector J1 are all opto-isolated. The opto-isolators are driven by the microprocessor in the module which holds the state of each control output. The opto-isolated outputs allow great versatility in connection, avoid potential ground loops and tolerate a variety of logic levels.

The NPN outputs of the opto-isolators can withstand up to 70 volts. Typical off state leakage current is 50 nanoamps or less. Maximum recommended output current is 3 milliamps.

The following table summarizes the on characteristics of the opto isolators when turned on. The max numbers are extrapolated from the manufacturers data book and should be considered as best estimates. The typical data was measured on actual production fader modules.

Iout, mA	Vce, typ	Vce, Max
.3	.10	.2
1	.14	.3
2	.18	.6
3	.22	1.5

Table 1 - Opto Isolator Current versus Voltage

During power-on reset, which typically lasts about 100 msec after the turn on of the 5 volt logic supply, the state of the outputs is indeterminate. Following power-on reset, all opto outputs are off.

opto output schematic

Each of the console channel mutes is electronically controlled by an opto-isolator on the Uptown fader module. There are four output opto isolators in each fader module. The following schematic illustrates the opto outputs on connector J1. All eight of the opto outputs are NPN. The opto will work much like a switch as long as you connect the collector to the most positive point in the circuit and the emitter to the more negative point in the circuit. In most cases, only the mute connections to connector J1 switch 2 will be used.

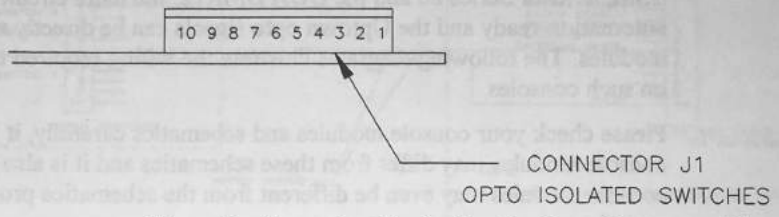


Figure 9 - Connector Numbering for Opto Outputs on J1

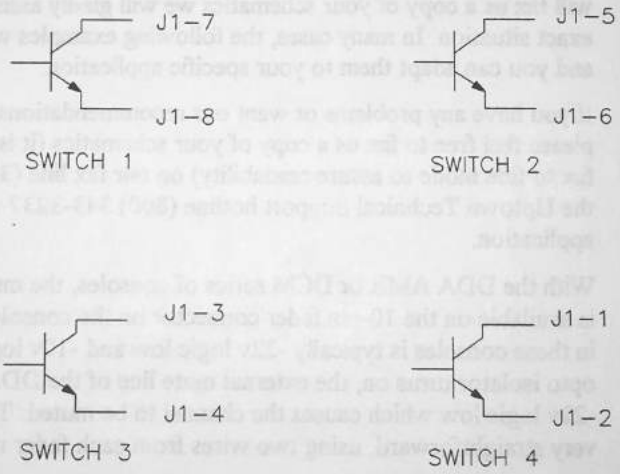


Figure 10 - Schematic of Opto Outputs on J1

Mute Control Examples

Although we cannot guarantee that the following examples will show how to connect our mute control outputs to your specific console, the following schematics illustrate the general principles involved in controlling console mutes with the opto isolators.

For clarity, each of the following schematics will show only one channel of mute connections. All other channels are wired similarly.

In some cases, such as the DDA AMR, DDA DCM, the Neotek Elite, the Trident TSM, Trident Series 80 and the DDA DMR12, the mute circuit interface is automation-ready and the Uptown opto signals can be directly wired to the console modules. The following diagrams illustrate the wiring required to automate the mutes on such consoles.

Please check your console modules and schematics carefully, it is possible that your console modules may differ from these schematics and it is also possible that your console modules may even be different from the schematics provided with your console.

Since all manufacturers routinely improve and change their consoles, it is not possible for us to provide schematics for every version of every console, but if you will fax us a copy of your schematics we will gladly assist you in interfacing to your exact situation. In many cases, the following examples will show you the general idea and you can adapt them to your specific application.

If you have any problems or want our recommendations for your specific console, please feel free to fax us a copy of your schematics (it is usually necessary to set your fax to fine mode to assure readability) on our fax line (303) 581-0114 and then call the Uptown Technical Support hotline (800) 343-3237 to discuss your specific application.

DDA AMR or DCM mute

With the DDA AMR or DCM series of consoles, the mute control line for each channel is available on the 10-pin fader connector on the console motherboard. The logic levels in these consoles is typically -22v logic low and -10v logic high. When the Uptown opto isolator turns on, the external mute line of the DDA input module is pulled to the -22v logic low which causes the channel to be muted. The wiring for this console is very straightforward, using two wires from each fader module.

On some DDA motherboards, the -22v logic signal may not be connected to the 10-pin connector. Since the -22v logic level is required to mute the console, you must make provisions to get the -22v to the connector. The AMR uses motherboards that link together groups of modules. The -22v is bussed across all modules on each section of motherboard, so the only task is to get the -22v to any one connector of each motherboard section. Please note that some DDA schematics may number the pins of the 10-way connector differently than our illustrations, but in all cases the -22v should be on the end of the connector opposite to the audio signals.

There is a link that can be connected on each section of motherboard, but it is on the bottom of the motherboard and may be difficult to install. It may be more convenient

to simply run a wire from the -22v power connector on the rear of the console directly up to one 10-way connector on each section of motherboard.

It is very important to make certain that the DDA fader connectors are not plugged into the motherboard backwards. If the 10-pin connector is installed backwards, the console 18 volt supplies will be applied to the fader and will probably destroy the fader.

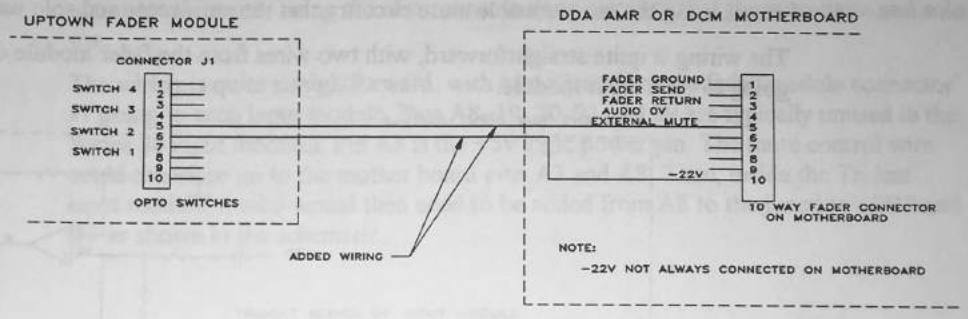


Figure 11 - DDA AMR or DCM Mute Interface

Trident TSM mute

In the Trident TSM, the input module mute switch on the console is used to directly short the audio to ground right at the switch, while the auto-mute and solo muting are performed by a transistor. Therefore, the Trident input module mute switch performance is slightly different from the auto-mute or solo mute performance. If you are satisfied with the performance of the auto-mute and solo mute, which generally seem to work very well, then the circuit shown below can be used to automate the mutes using the same console mute circuitry that the auto-mute and solo use.

The wiring is quite straightforward, with two wires from the fader module connector J1 going to each input module.

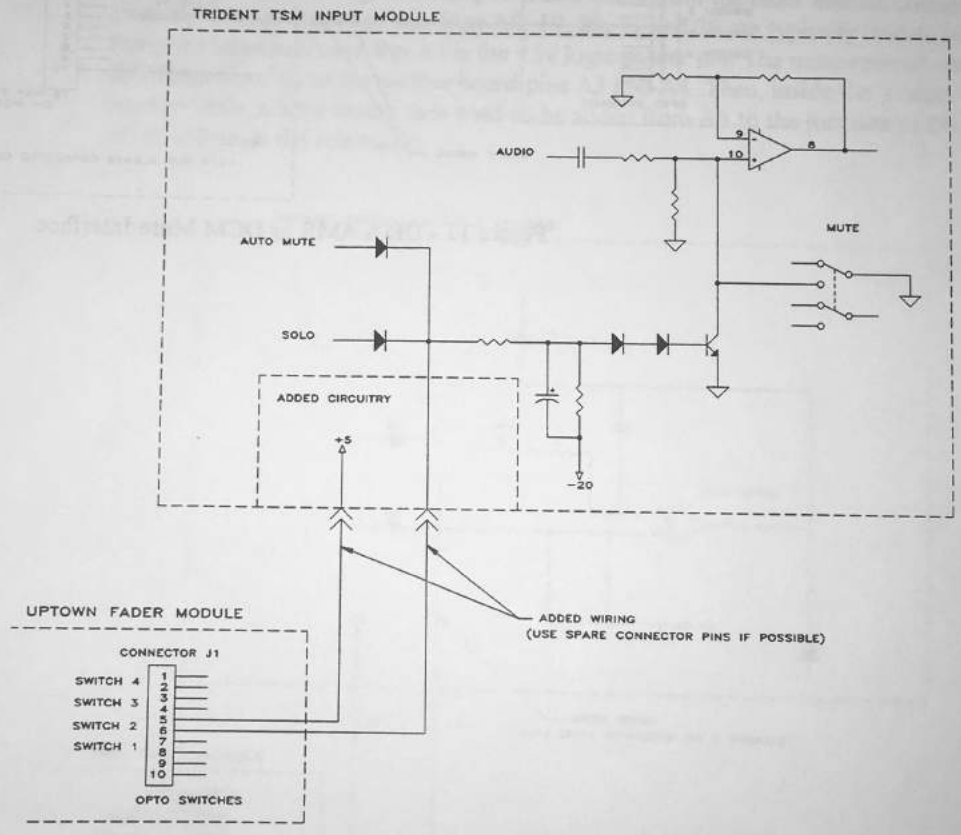


Figure 12 - Trident TSM Mute Wiring

Trident Series 80 mute

In the Trident 80 series, like the TSM, the input module mute switch on the console is used to directly short the audio to ground right at the switch, while the auto-mute and solo muting are performed by a transistor. Therefore, the Trident input module mute switch performance is slightly different from the auto-mute or solo mute performance. If you are satisfied with the performance of the auto-mute and solo mute, which generally seem to work very well, then the circuit shown below can be used to automate the mutes using the same console mute circuitry that the auto-mute and solo use.

The wiring is quite straightforward, with two wires from the fader module connector J1 going to each input module. Pins A8, 19, 20, 21 and 29 are typically unused in the Series 80 input modules. Pin A3 is the +5v logic power pin. The mute control wire could therefore go to the mother board pins A3 and A8. Then, inside the Trident input module, a wire would then need to be added from A8 to the junction of D2 and D3 as shown in the schematic.

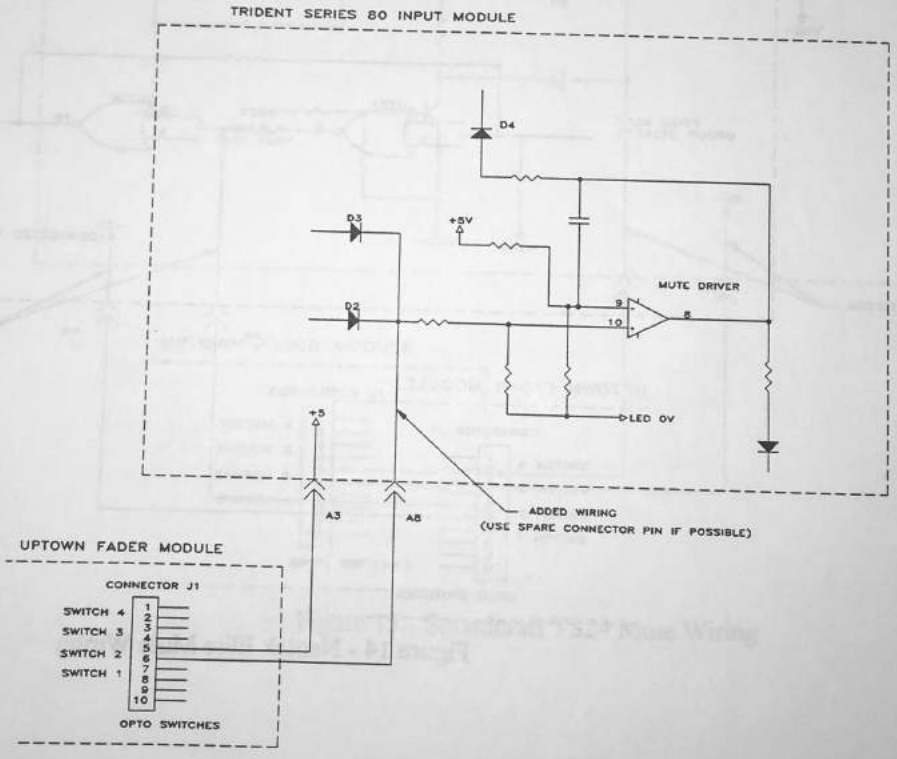


Figure 13 - Trident 80 Mute Wiring

Neotek Elite mute

The Uptown opto-isolators can be used to perform the function shown in the Neotek input mute logic schematic which shows the Direct Digital Interface (DDI). The various versions of the Elite mute circuit all use the same circuit board, but are simply loaded with different components to produce the Standard, MIDI and DDI mute logic circuits.

In the schematic shown below, a Standard version Elite input module is automated by simply adding a wire from P5-2 to pad U21-5 and another wire from P5-3 to pad U21-4. Note that U21 and R421 are not to be installed. If the module was originally equipped with DDI, remove U21 and R421. If the module was originally equipped with MIDI interface, simply remove Q308 and R421.

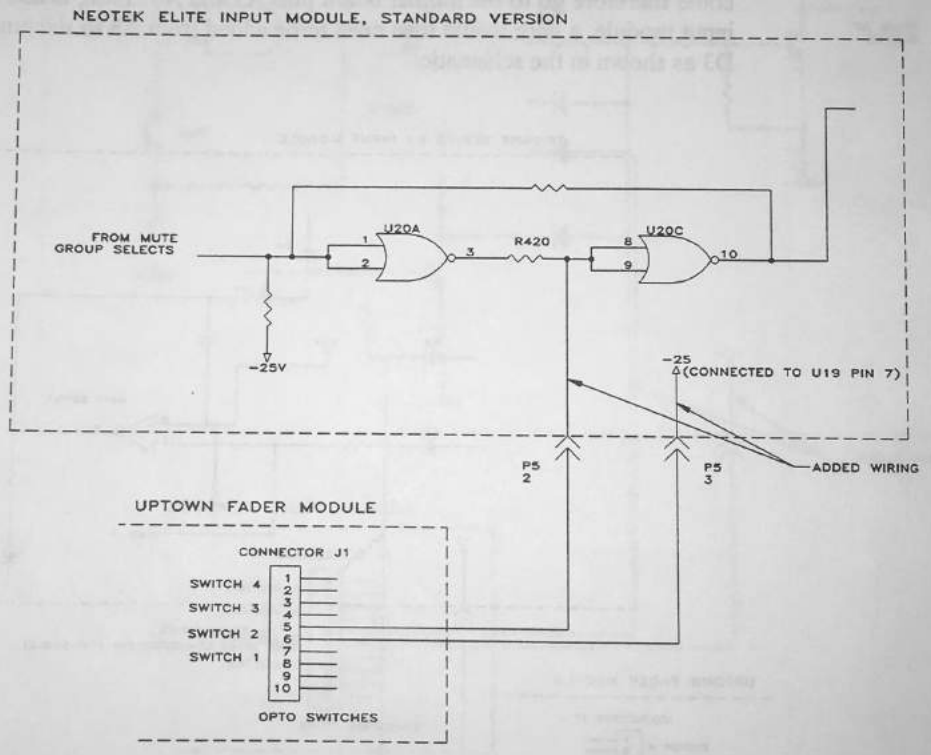


Figure 14 - Neotek Elite Mute Wiring

Soundcraft TS24 mute

The electronic muting of the TS24 is very easily controlled by the Uptown system. The logic levels of the TS24 are logic low is -22v and logic high is -10v. The schematic shown below illustrates the use of the opto-isolator in common emitter configuration. When the opto turns on, the console will be muted.

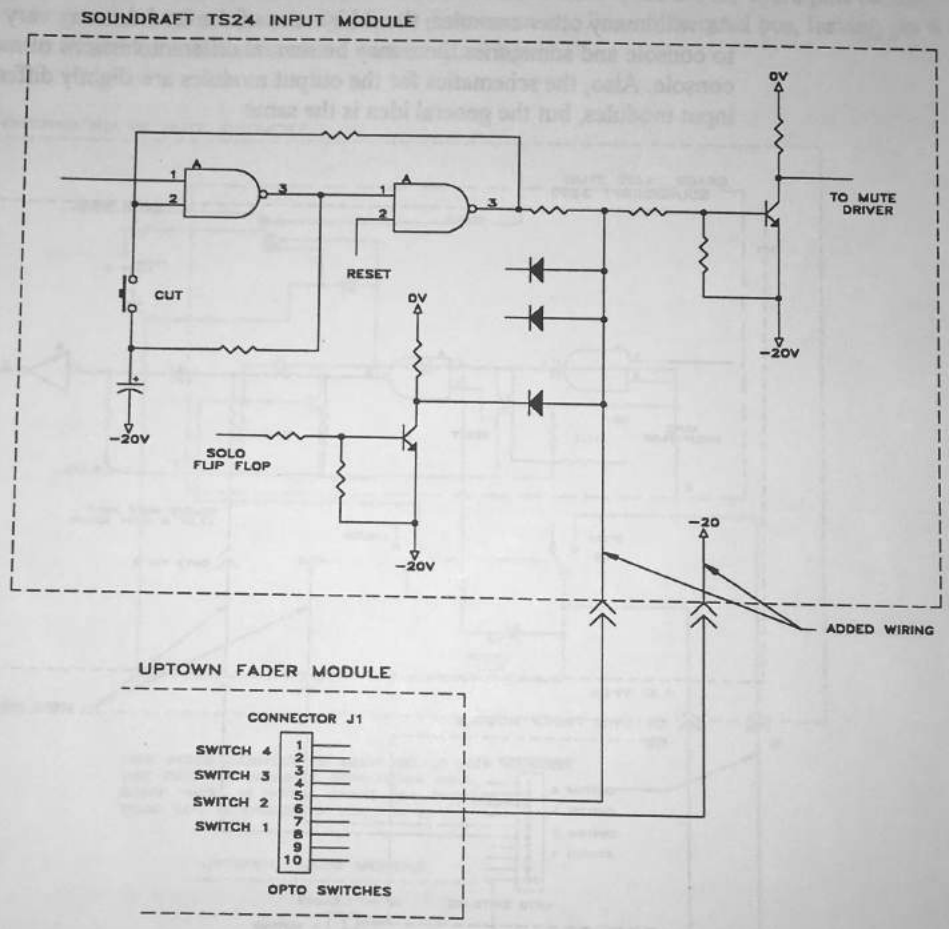


Figure 15 - Soundcraft TS24 Mute Wiring

Soundcraft 3200 mute

The Soundcraft 3200 is another example of a console using electronic mutes which are very easily controlled by the Uptown opto-isolated mute control signals. The logic low is -7.5v and the logic high is +7.5v. In the illustration shown below, the console channels will all be un-muted at power-on and an opto must be turned on to activate a mute.

As with many other consoles, the schematics of the modules may vary from console to console and sometimes there may be several different versions of modules in the console. Also, the schematics for the output modules are slightly different from the input modules, but the general idea is the same.

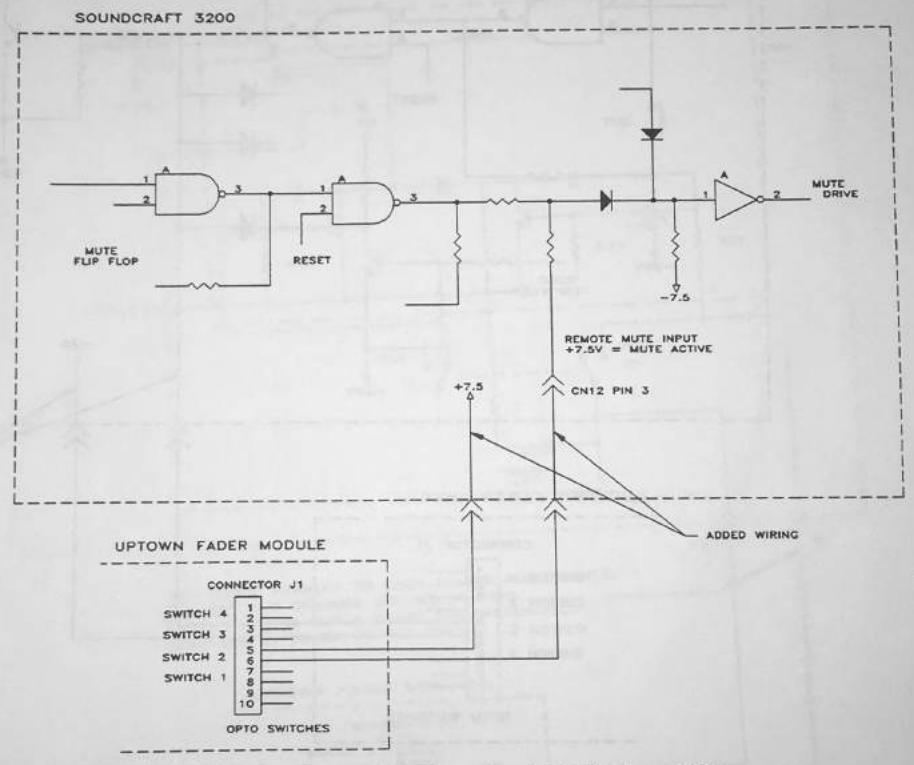


Figure 16 - Soundcraft 3200 Mute Wiring

Helios mute

The original P&G fader has a coupling capacitor installed in the fader. The capacitor should be relocated to inside the Helios aux module, near pin 26 which is the top of the fader.

In order to route the mute control signal into the Helios aux module, a pin on the aux module connector will need to be disconnected since there are no spare pins on the connector. One choice might be to disconnect one line of the quad bus, leaving pin 6 available for the automation mute control signal.

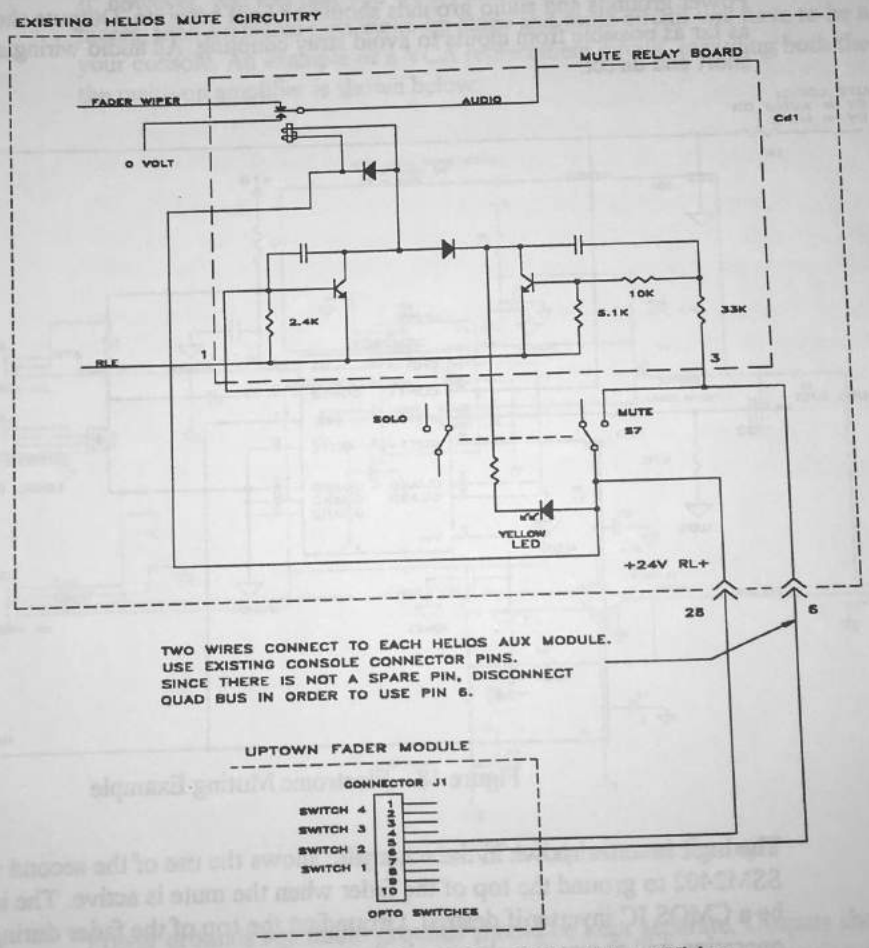


Figure 17 - Helios Mute Wiring

Adding Electronic Muting

Unfortunately, not all consoles have appropriate electronic mute circuitry which can be controlled by our opto-isolator. In such cases, it will be necessary to add a new electronic mute circuit. In most cases, the mute will be added pre-fader, but that is largely a matter of personal choice.

The following schematic depicts a high performance, yet quite simple, mute circuit based on the SSM2402 integrated circuit (now available from Analog Devices). The SSM2402 is appearing in many new console designs and is optimized to reduce the mute thump by turning off and on slowly. Typical turn off time is about 4 msec.

Power grounds and audio grounds should be kept separate. Outputs should be kept as far as possible from inputs to avoid stray coupling. All audio wiring should be kept short and direct.

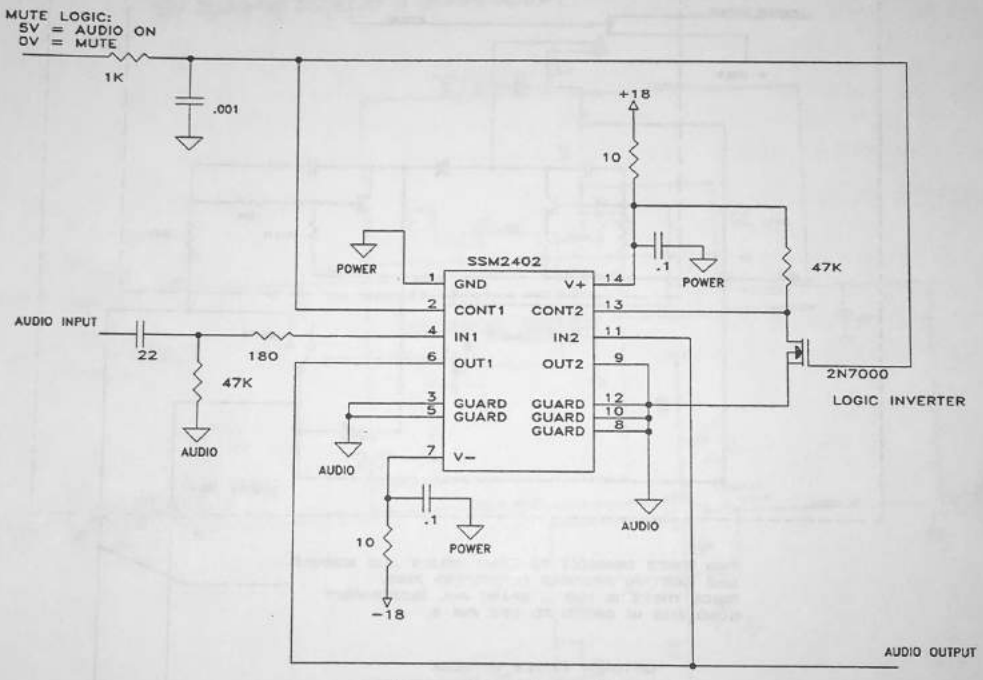


Figure 18 - Electronic Muting Example

The logic inverter shown in the schematic allows the use of the second section of the SSM2402 to ground the top of the fader when the mute is active. The inverter could be a CMOS IC inverter if desired. Grounding the top of the fader during the mute operation will assure the ultimate in mute performance, but this extra performance may not be required in all consoles. If you choose not to use any inverter, then pins 11 and 13 of the mute IC would be left unconnected and the top of the fader would be left floating during mute operation.

The 10 ohm power supply decoupling resistors should be 1/8 w or 1/4 w carbon composition or similar fusible resistor. Carbon film or metal film resistors should not be used for this purpose because they could overheat and become a safety hazard if the IC shorted.

VCA Replacement

When replacing VCA circuitry, you will generally need to add an amplifier stage to provide 10 to 15 dB of gain. If you are satisfied with the performance of your VCA circuitry, it may be best to simply order our special motorized VCA faders and then leave all of your VCA circuitry intact.

If, however, you feel that you would like to remove the VCA circuitry and use audio faders, then a suitable gain make-up stage and mute circuit will have to be added to your console. An example of a VCA replacement circuit, including both the mute and the make-up amplifier is shown below:

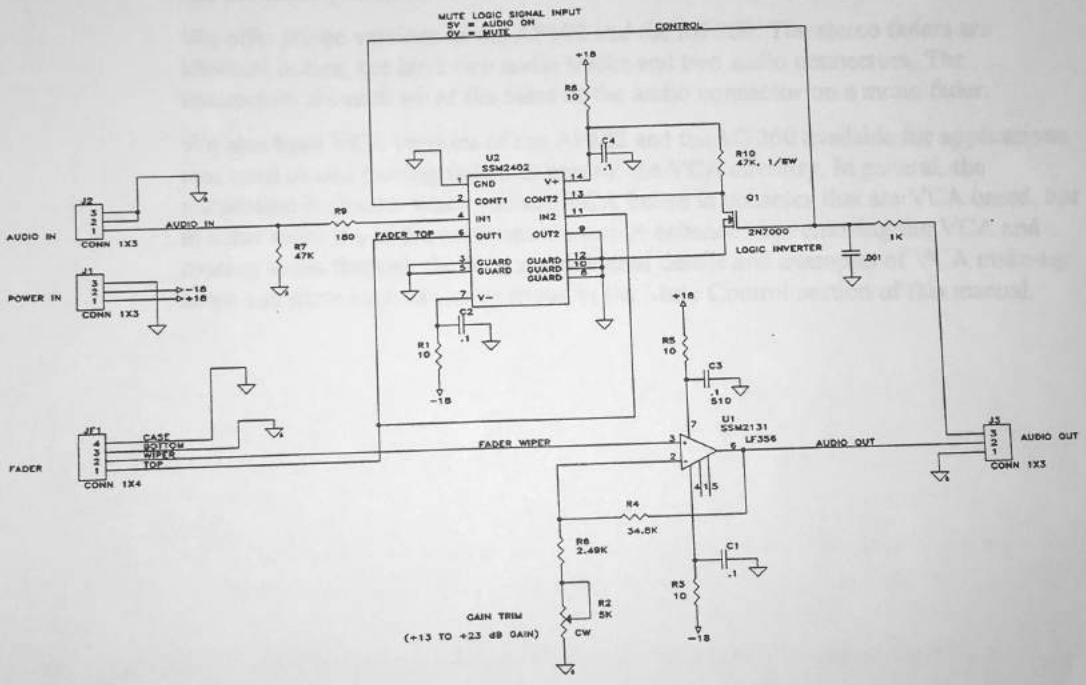


Figure 19 - VCA Replacement Example

Power grounds and audio grounds should be kept separate. Outputs should be kept as far as possible from inputs to avoid stray coupling. All audio wiring should be kept short and direct. The SSM2131 is a high quality low noise op amp available from Analog Devices. The OPA604 from Burr-Brown is a high quality, fast, low distortion op amp which should also be considered. For less demanding applications, the LF356 may be adequate.

The 10 ohm power supply decoupling resistors should be 1/8 w or 1/4 w carbon composition or similar fusible resistor. Carbon film or metal film resistors should not be used for this purpose because they may overheat and cause a safety problem if the IC shorted.

Uptown has designed and built some VCA replacement and mute boards for some specific consoles, so check with us for availability before building your own.

Fader Specifications

Fader Specifications

At present, we offer two faders for use with the System 2000. Our standard fader, the AF102N, is recommended for all applications where it will fit. If space becomes a problem, then you can select the MF260N miniaturized fader. Since the MF260N has a smaller size motor to fit into the smaller fader it is somewhat slower than the AF102N, but the audio performance of the two faders is virtually identical.

We offer stereo versions of the AF102 and the MF260. The stereo faders are identical in size, but have two audio tracks and two audio connectors. The connectors are each wired the same as the audio connector on a mono fader.

We also have VCA versions of the AF102 and the MF260 available for applications that need to add moving faders to control the VCA circuitry. In general, the installation is simpler when you use VCA faders in consoles that are VCA based, but in some cases the audio performance can be enhanced by removing the VCA and routing audio through the faders. Additional details and examples of VCA make-up amps and mute circuits can be found in the Mute Control section of this manual.

The following illustrations depict the dimensions of the faders and also include full size illustrations that can be used to verify fit in a console.

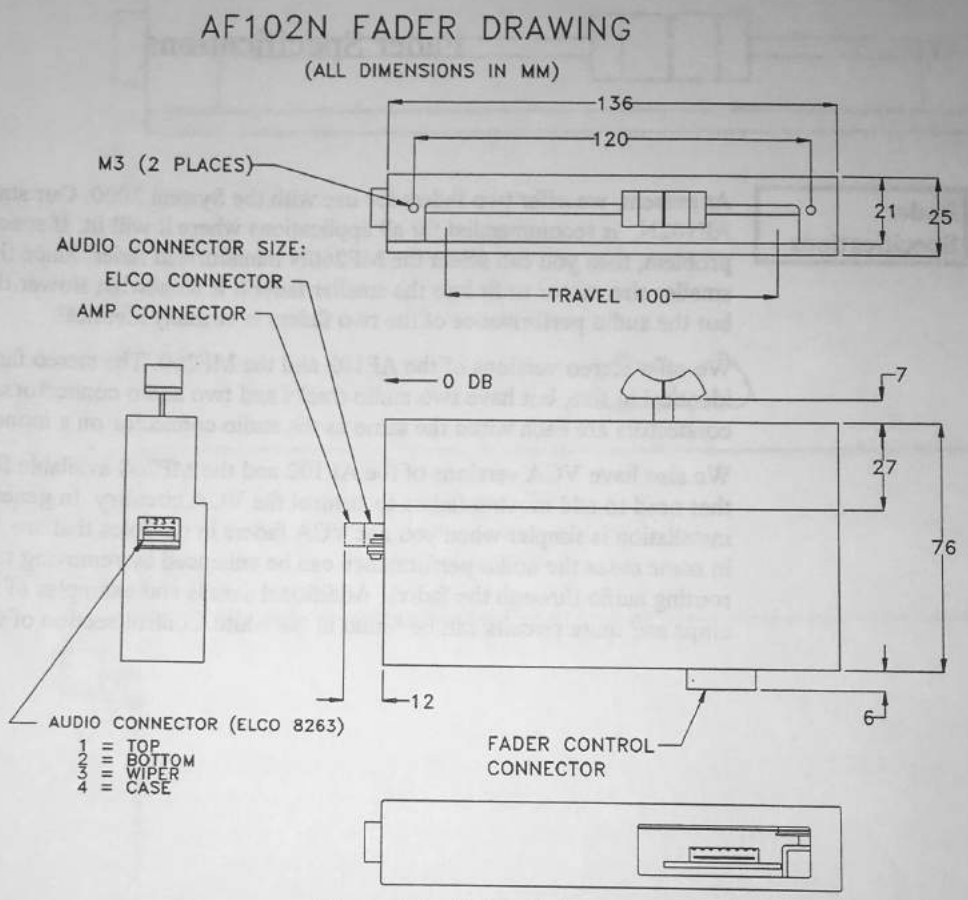


Figure 20 - AF102 Fader Drawing

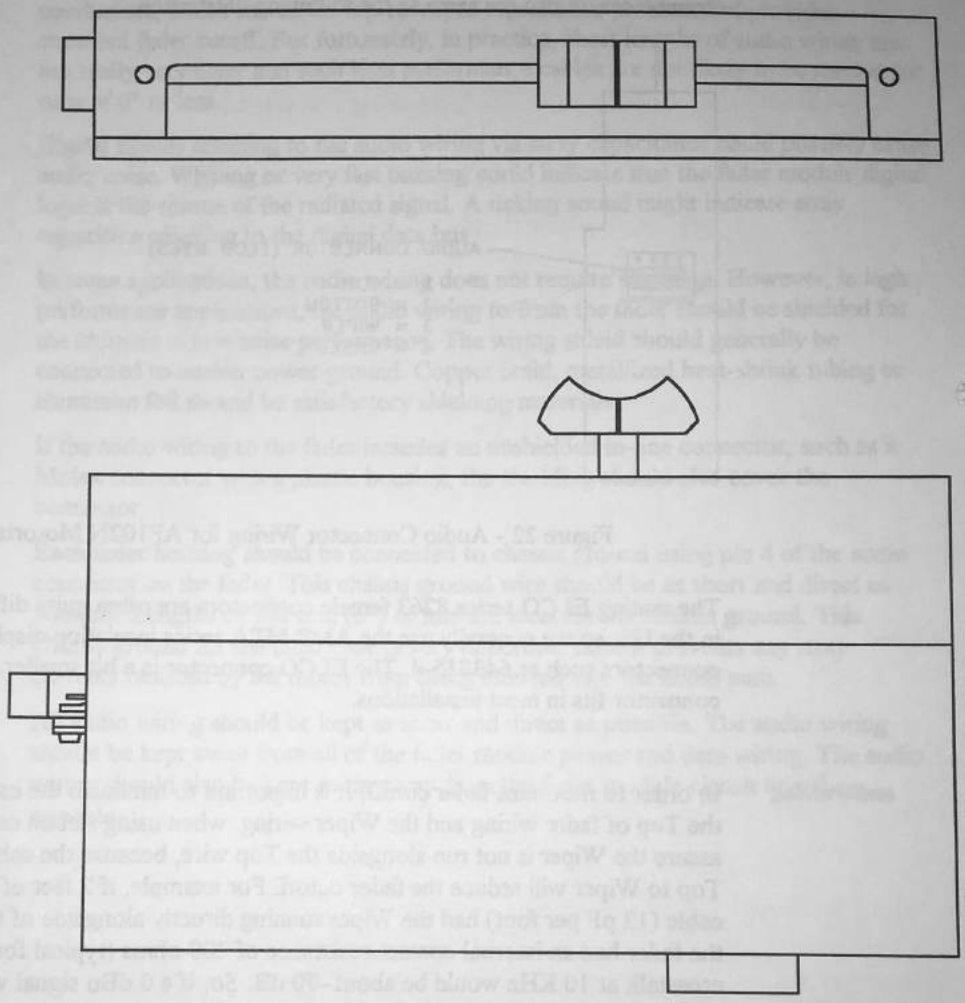


Figure 21 - Full Size Illustration of the AF102N Motorized Fader

Audio Connector

The TKD motorized faders which are normally supplied with the Uptown™ systems have an ELCO series 8263 4-pin connector for the audio wiring. With the connector, the fader can easily be used in a variety of systems and easily adapted to special requirements. The ultimate in performance would be to use a fully shielded audio cable, but in some cases, ribbon cable is fine.

The audio connector on the AF102 mono fader is shown below. The audio connector for the MF-260 mono fader is in a slightly different location, but is wired exactly the

same. The connector pinout for the stereo faders, which have two identical connectors, is also the same as the following illustration.

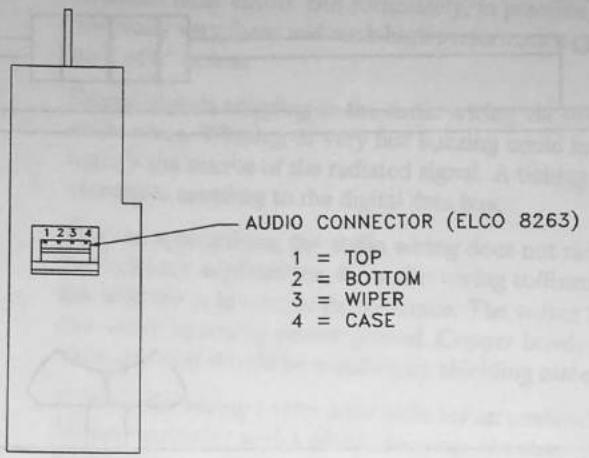


Figure 22 - Audio Connector Wiring for AF102N Motorized Fader

The mating ELCO series 8263 female connectors are often quite difficult to procure in the US, so we generally use the AMP MTA series insulation displacement connectors such as 643815-4. The ELCO connector is a bit smaller, but the AMP connector fits in most installations.

audio wiring

In order to maximize fader cutoff, it is important to minimize the capacitance between the Top of fader wiring and the Wiper wiring. when using ribbon cable, take care to assure the Wiper is not run alongside the Top wire, because the cable capacitance from Top to Wiper will reduce the fader cutoff. For example, if 2 feet of 28 AWG ribbon cable (12 pF per foot) had the Wiper running directly alongside of the Top wire, and the fader had an internal contact resistance of 200 ohms (typical for audio faders), the crosstalk at 10 KHz would be about -70 dB. So, if a 0 dBu signal was on the Top, the fader cutoff could never be better than -70 dBu.

The fader connector is designed to allow ribbon cable to be used successfully because the Bottom wire (typically audio ground) is placed between the Top and Wiper wires to greatly reduce the effects of capacitive coupling.

Hypothetically, we believe that the ultimate in audio wiring for the fader would have three individually shielded conductors, foamed dielectric, and an overall shield. The individual shields, connected to audio ground, would eliminate conductor to conductor capacitance, while the overall shield, connected to chassis ground, would keep stray fields off of the audio wiring.

Belden 8733 is a readily available audio cable with three individually shielded conductors, which solves the top-to-wiper capacitance problem and provides excellent fader cutoff. But fortunately, in practice, short lengths of audio wiring are not really very fussy and such high performance cables are not likely to be needed for runs of 6" or less.

audio noise

Digital signals coupling to the audio wiring via stray capacitance could possibly cause audio noise. Whining or very fast buzzing could indicate that the fader module digital logic is the source of the radiated signal. A ticking sound might indicate stray capacitive coupling to the digital data bus.

In some applications, the audio wiring does not require shielding. However, in high performance applications, the audio wiring to/from the fader should be shielded for the ultimate in low noise performance. The wiring shield should generally be connected to analog power ground. Copper braid, metallized heat-shrink tubing or aluminum foil should be satisfactory shielding materials.

If the audio wiring to the fader includes an unshielded in-line connector, such as a Molex connector with a plastic housing, the shielding should also cover the connector.

Each fader housing should be connected to chassis ground using pin 4 of the audio connector on the fader. This chassis ground wire should be as short and direct as possible. Lengths of 150 mm (6") or less are ideal for the chassis ground. This chassis ground for the fader case is very important since it prevents any stray currents radiated by the motor from being induced into the audio path.

All audio wiring should be kept as short and direct as possible. The audio wiring should be kept away from all of the fader module power and data wiring. The audio wiring should also be kept as far away from the fader module circuit board as possible.

The following illustration shows the major dimensions of the MF260 miniaturized fader:

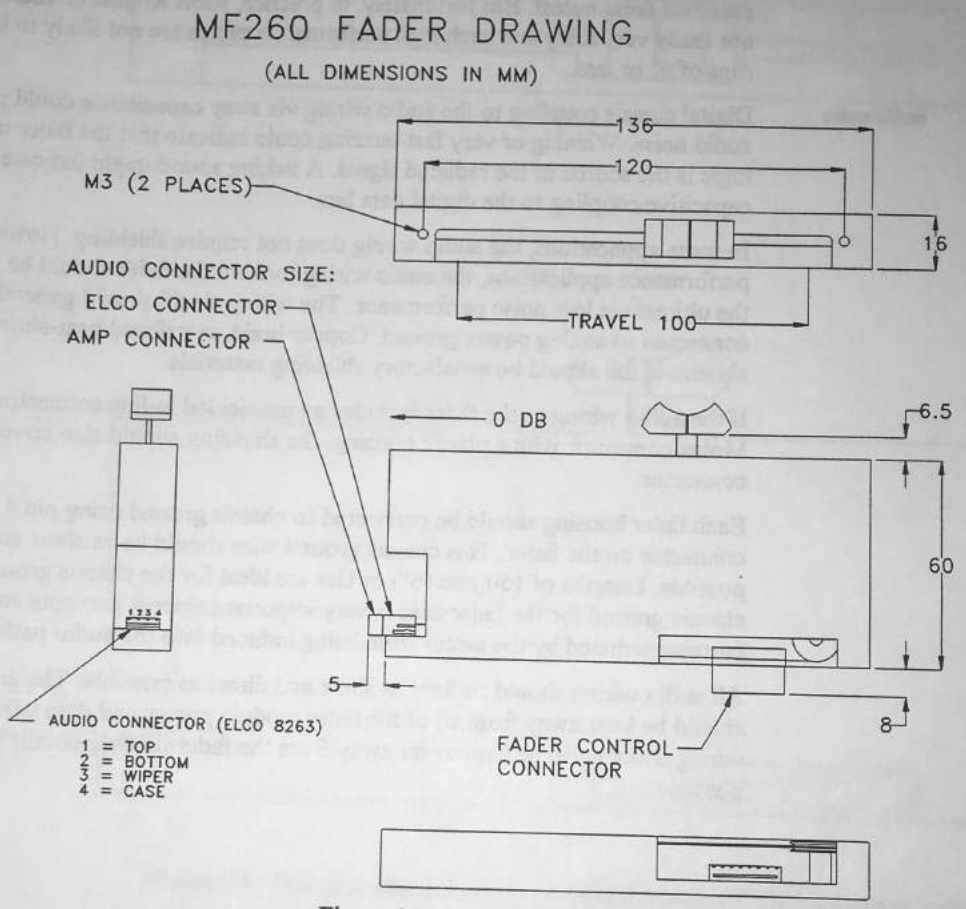


Figure 23 - MF260 Fader Drawing

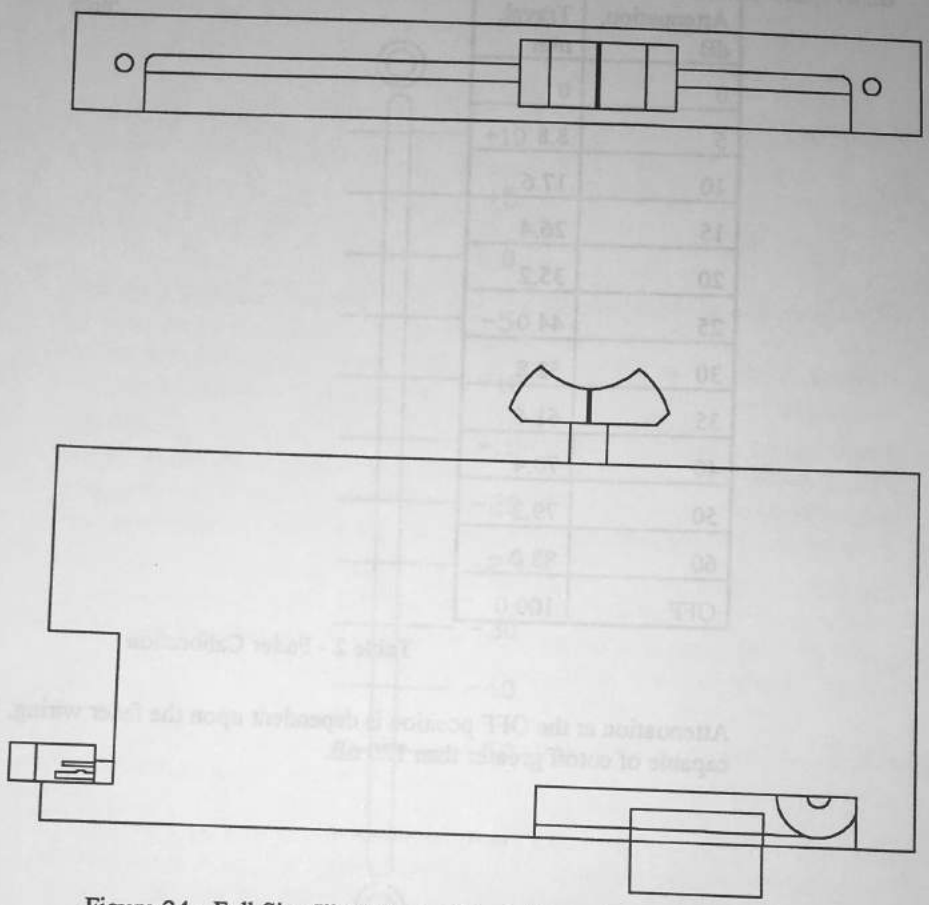


Figure 24 - Full Size Illustration of the Miniaturized MF260 Motorized Fader

Fader Calibration

There are a wide variety of fader calibration schemes. Consequently, it is very unlikely that the fader calibration marks on your existing metalwork will agree precisely with our faders.

For both the AF102N and the MF260N, the fader calibration is as follows. Please note that this fader calibration data shows the attenuation relative to the setting at the top of the fader and therefore starts off at zero dB.

Attenuation, dB	Travel, mm
0	0
5	8.8
10	17.6
15	26.4
20	35.2
25	44.0
30	52.8
35	61.6
40	70.4
50	79.2
60	88.0
OFF	100.0

Table 2 - Fader Calibration

Attenuation at the OFF position is dependent upon the fader wiring, but the fader is capable of cutoff greater than 120 dB.

Following is a full size illustration of typical audio fader calibration with +10 dB gain:

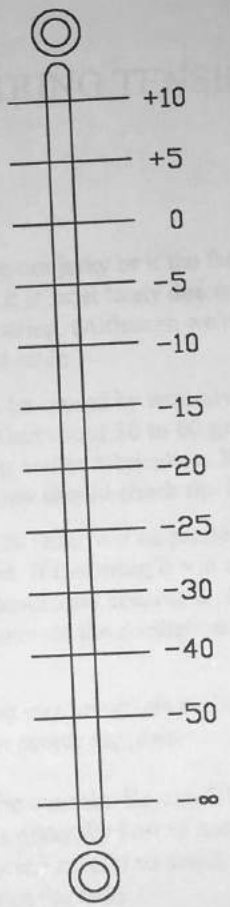


Figure 25 - Audio Fader Calibration

The normal fader audio track resistance is 10K ohms ± 10%. Stereo and mono versions of the AF102 and MF260 are available in the same size faders with the same calibration. We also offer both the AF102 and MF260 faders with a 2.7K ohm VCA track in place of the audio track.

Touch Sensor

It is very important that the fader shaft and knob not touch any metalwork during normal operation, since even the slightest contact with the console chassis will send the signal to the automation system that the knob has been touched.

AF102 FADER STRING TENSION ADJUSTMENT

Introduction

If the fader movement becomes jerky or if the fader begins to occasionally buzz at a rate of about 30 to 60 Hz, it is most likely due to excessive friction or due to an improperly adjusted fader string. (Although we refer to it as a string, it is actually a nylon coated stainless steel cable.)

Jerky fader movement can be caused by excessive friction in the fader bearings. If the fader knob requires more than about 30 to 60 grams to begin movement, then the bearings may need cleaning and/or lubrication. If the force required to move the fader seems normal, then you should check the fader string tension.

If the string is too loose, the fader will be prone to move erratically, oscillate and may cause a buzzing sound. If the string is too tight, the fader movement will be sluggish and may not be positioned accurately. So, the goal is to achieve a setting which is tight enough to prevent the oscillation but loose enough to allow the fader to move easily.

Power Off

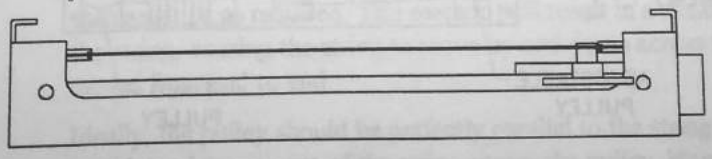
Before making any tension measurements or any tension adjustments, be certain to turn off the automation system power supplies.

Tension Measurement for AF102

Remove the fader from the console. Be careful not to pull on the wires when removing the fader connectors. It is generally best to use a small screwdriver or similar tool to pry the connectors out, being careful to avoid pulling on the delicate wires. Then, remove the side cover from the fader.

In order to check the string tension, position the fader knob at the top end of travel (all the way towards the audio connector).

As an overview, following is a somewhat simplified illustration of the inside of the fader, as you would see it if you removed the fader side cover, looking down at the top of the fader.



FADER INTERIOR, TOP VIEW

Figure 26 - Fader Interior

Now, using a force gauge (or a small, smooth, tool such as an awl to avoid damage to the string), check the deflection at a point midway between the top two pulleys as shown in the figure below. A force of 20 grams (about 1 ounce) should deflect the string 2 to 4 mm (.080 to .160 inches). The ideal deflection is 3 mm (.120 inches) with a force of 20 grams. The force should be applied so as to deflect the string toward the steel shaft, not forcing the string in or out, but only applying force perpendicular to the side cover of the fader.

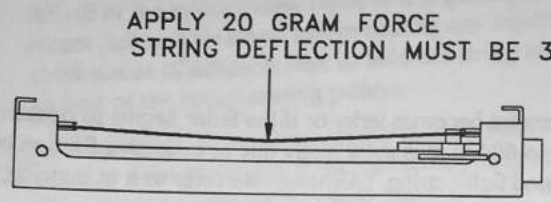


Figure 27 - Fader String Deflection

Since the distance from the normal string position to the steel shaft is about 6 mm (.24 inches), the ideal string deflection is 1/2 of the distance from the normal string position to the steel shaft.

If the string tension is proper and the fader still runs rough, then the fader carriage shafts should be cleaned and lubricated. If the string tension is out of tolerance, then adjust the tension as follows.

Tension Adjustment

The fader string tension is adjusted by means of the movable pulley shown in the illustration below. In older faders, the movable pulley is adjusted by loosening a small, delicate retaining screw and repositioning the pulley slightly. In the newest faders, there is a tension adjusting screw which can be adjusted from the end of the fader.

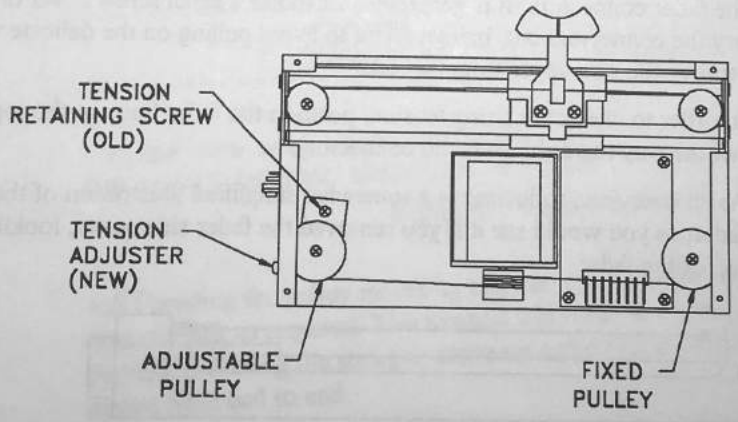


Figure 28 - Fader Tension Adjustment

On older faders, the moveable pulley is locked in place with the retaining screw and the assembly is also held in place with adhesive. Due to the adhesive, when you loosen the screw, the pulley adjuster will not move freely, and will require considerable force to initially break the adhesive bond.

don't let the string fall off

When adjusting the string tension, it is very important to avoid allowing the string to fall off of the motor pulley because it is quite difficult to reinstall the string on the motor pulley. Therefore, before making any adjustment to the tension, it is best to use small pieces of adhesive tape to hold the string in place on the motor pulley as well as all four of the string routing pulleys.

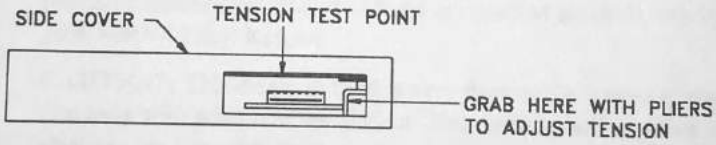
In this manner, if the string should become too slack during adjustment it cannot possibly come unwound from the motor pulley or drop off of the routing pulleys. This simple precaution may save you a lot of time and frustration.

On the newer faders, the pulley tension adjustment screw is readily available on the side of the case and no special precautions are necessary.

fine tuning of old style faders

In some very minor cases, such as fine tuning to get the desired string deflection, the string tension of the older style faders can be adjusted by simpler means. The simplest way to make minor adjustments to the string tension of the older style faders is to slightly bend the fixed pulley mounting bracket which is welded to the case, shown on the right in the illustration above.

In order to adjust the tension, use a pair of very durable long nose pliers to grab the portion of the tension pulley mounting bracket which is perpendicular to the case, as shown in the figures above. The pulley mounting bracket is made of steel and is not easy to bend, so you will have to make a very deliberate effort to change the tension any significant amount.



FADER VIEW WITH COVER INSTALLED
AND FEMALE CONTROL CONNECTOR REMOVED

Figure 29 - Fader Pulley View

After bending the pulley mounting bracket, you should check the string tension and then readjust as required. This method will result in a misalignment of the pulley with the string, causing the string to move up and down across the pulley when the fader moves from end to end.

Ideally, the pulley should be perfectly parallel to the string and there will not be any such lateral movement of the string across the pulley. However, as long as the misalignment is very small, there are no ill effects. If the misalignment is large, there will be excessive wear on the pulley and there may be some audible noise of the

string rubbing on the side of the pulley groove. So, this method is best suited for very small fine-tuning adjustments, not major adjustments.

You may have to make several attempts before you get the tension set properly.

String Tension Final Test

When you think you have it set right, plug in the fader motor connector, power up the system and test the fader for proper movement. If it still moves erratically or buzzes, then tighten the string a little bit more. However, if the oscillation is gone but the accuracy is not good, then loosen the string slightly.

In most cases, the best results will be obtained with the string tension adjusted to the recommended values. If the fader string seems to need to be adjusted much beyond the recommended values, there may be another problem such as excessive friction, improper software fader parameters or a component failure in the motor drive electronics.

If all else fails and you would like us to service the fader, call or fax Uptown Automation for a return merchandise authorization number (RMA) and then send the complete fader directly to Uptown Automation.

Fader Cleaning

Fader Cleaning

The following cleaning procedure was devised by our fader manufacturer, TKD, specifically for field service of their faders. The fader bearings and shafts should be cleaned and lubricated whenever the fader movement begins to feel too heavy or when the fader performance seems sluggish. The audio element should be cleaned following bearing cleaning or whenever the audio noise level of the fader seems to have increased.

Dust, dirt and smoke in the air, as well as larger bits such as cookie crumbs, cigarette ashes or hair, can cause deterioration of the performance of the fader. Keeping the console and the studio air as clean as possible will reduce the contamination inside the fader and minimize the required maintenance.

Fader Cleaning Fluid

Two types of cleaning fluids have been recommended by TKD. For cleaning the audio tracks and cleaning normal dust from the shafts and bearings, the best solvent is 100% Methanol (methyl alcohol).

For severely contaminated faders, the recommended cleaning fluid is a specially prepared mixture of 20-30% Methanol (methyl alcohol), 40-50% Toluene and 10-20% Methyl Ethyl Ketone.

CAUTION: This cleaning fluid is very flammable. Avoid contact with skin or eyes. Use only with adequate ventilation. This mixture will dissolve most paint and most plastics... so use with caution.

We do not recommend the use of any other solvents to clean the fader tracks, shafts or bearings.

Fader Lubricant

The lubricant recommended by the fader manufacturer is Sumitech 731, a Japanese product which is not widely available. The lubricant must be of moderate viscosity and must not produce any vapors which could cause deterioration of the audio tracks.

We have tried various lubricants and have found Lubriplate, a lithium based compound, to be satisfactory. This is widely available in the US in small 1 3/4 ounce (49 gm) tubes through GC Electronics, part number 23-2S.

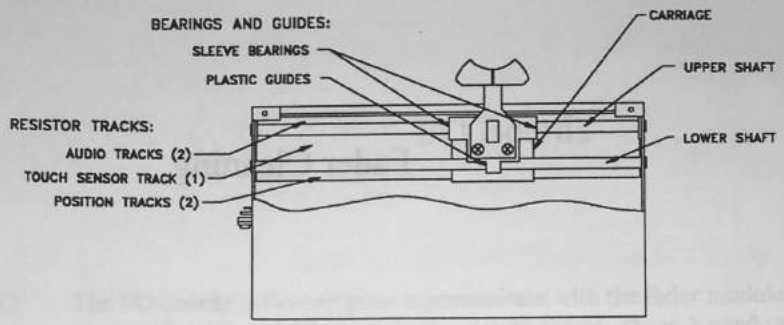


Figure 30 - Fader Cleaning

Cleaning of the Fader Bearings and Shafts

a.) Using a suitable syringe, inject cleaning fluid into the bearings. Move the fader carriage from end to end 5 or 6 times as required. By doing so, the contaminants should flow out of the bearings. If the contamination is not fully removed, you must repeat this procedure several times. As the lubricant is flushed out of the bearings, the bearings will not move smoothly on the shaft.

b.) After you believe that all of the contaminants have been flushed from the bearings, wipe the two shafts clean using a cloth or cotton swabs soaked with the cleaning fluid.

c.) Using care to avoid getting lubricant on adjacent surfaces, put about 0.3 cc of lubricant on the upper bearing shaft. Put about 0.2 cc of lubricant on the lower shaft in the areas where the plastic guides touch the shaft. Spread the lubricant along the shaft by moving the fader carriage from end to end several times. Wipe away any excess lubricant which accumulates at the ends of the shafts to prevent contamination of the audio tracks.

Cleaning of the Audio Tracks and Wipers

The audio tracks are generally very fussy about contamination due to any sort of oil or lubricant. If you can see any sort of stain or streak on the audio tracks, you will probably be able to hear some audio noise when the wiper touches that contaminated area. Do not use any sort of lubricant or anti-oxidant on the audio tracks or wipers.

a.) Using a suitable syringe, put about 10 cc of the cleaning fluid on the audio tracks near where the wipers touch the tracks.

Leave the fluid on the tracks for about 5 minutes and then work loose the contamination by moving the fader carriage end to end several times. Repeat this step 2 or 3 times as required.

b.) Wipe out the cleaning fluid and contamination with a clean cloth or cotton swabs.

c.) Polish the tracks with a fresh, clean cloth or swab until no contamination, streaks or stains are seen on the audio tracks.

I/O Boards

Computer I/O Board

The I/O boards in the computer communicate with the fader modules. The data cable requires 3 conductors for each bank of eight faders. These 3 conductors carry the ground reference, serial clock and serial data from the I/O board in the computer to each bank of System 2000 fader modules.

Each I/O board in the computer can communicate with up to four banks of fader modules.

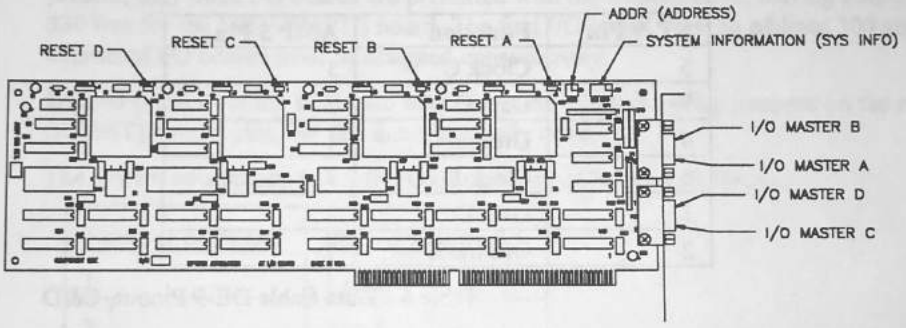


Figure 31 - I/O Board

The DE-9 connector near the top of the I/O board (farthest away from the PC motherboard connector), interfaces to two banks of faders. These two upper I/O ports are called A and B. Each of these two ports can be connected to one bank of faders. Each bank normally has eight faders, but can actually handle any number up to nine fader modules. The data is routed from the I/O board to the fader module via a data cable. The data cable has a DE-9 connector to plug into the I/O board and 3-pin AMP polarized connectors to plug into one fader module in each bank. The pinout for the A/B port connectors is as follows:

DE-9 Pin	Function	AMP 3 Pin
5	Clock A	3
9	Data A	2
4	Ground A	1
6	Clock B	3
1	Data B	2
2	Ground B	1

Table 3 - Data Cable DE-9 Pinout, A&B

The DE-9 connector near the bottom of the I/O board (closest to the PC motherboard connector) also interfaces to two banks of faders. These two lower I/O ports are called C and D. Each of these two ports can be connected to a bank of faders using a 3-pin AMP polarized connector. The pinout for the connectors is as follows:

DE-9 Pin	Function	AMP 3 Pin
5	Clock C	3
9	Data C	2
4	Ground C	1
6	Clock D	3
1	Data D	2
2	Ground D	1

Table 4 - Data Cable DE-9 Pinout, C&D

Do not use any pins other than those listed in the tables above. Uptown reserves the use of these pins, and other signals or voltages may be present.

For consistency and compatibility with Uptown test and demo programs, we recommend that the I/O board having address setting 300 (the system's first I/O board) use port A to connect to the first bank of faders, that is faders 1 through 8 (where fader 1 is the leftmost fader in the console). Port B of the first I/O board should connect to the second bank of faders, Port C to the third bank of faders and Port D to the fourth bank of faders. Used in this manner, these ports are called A1, B1, C1 and D1.

The I/O board having address setting 310 (the system's second I/O board) should use port A to connect to the fifth bank of faders, that is faders 33 through 40. Port B of the first I/O board should connect to the sixth bank of faders, Port C to the seventh bank of faders and Port D to the eighth bank of faders. These ports are termed A2, B2, C2 and D2.

The System 2000 is designed to support up to a maximum of 96 faders using three I/O boards and 12 banks of 8 faders.

Jumpers

The following illustration shows the function and numbering of the jumpers on the I/O board:

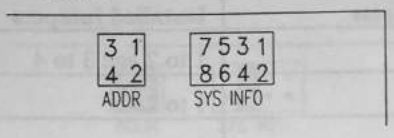


Figure 32 - I/O Board Jumper Pin Numbering

The system information (SYS INFO) jumpers tell the computer how many banks of fader modules this specific I/O board will communicate with and also define whether additional I/O cards are to be interrogated.

The address (ADDR) jumpers define the location of the I/O board in the I/O space of the AT computer. The possible addresses are 300, 310, 320 and 330. However, at present, only three I/O boards are permitted with the System 2000, leaving address 330 free for the MIDI/SMPTE board. The first I/O board must be address 300 and additional I/O boards must be assigned consecutively.

Unused portions of the I/O board may be turned off by installing jumpers on the reset (RESET) jumper pins, but this in not normally done.

The system information (SYS INFO) jumpers must be set as follows:

Number of banks	Installed jumpers
1	1 to 2
2	3 to 4
3	1 to 2 and 3 to 4
4 (Normal)	5 to 6

Table 5 - I/O Board SYS INFO Jumper, Number of Banks

Additional I/O Card	Installed jumpers
no	none
yes	7 to 8

Table 6 - I/O Board SYS INFO Jumper, Additional I/O Card

The address (ADDR) jumpers must be set as follows:

Board	Address	Installed jumpers
First	300	1 to 2 and 3 to 4
Second	310	1 to 2
Third	320	3 to 4
Fourth	330	none

Table 7 - I/O Board ADDR Jumper

The following illustrations show how the I/O board jumpers are to be set for various sizes of systems, depending upon how many I/O boards are used:

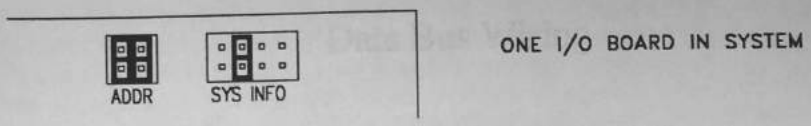


Figure 33 - System With Only One I/O Board

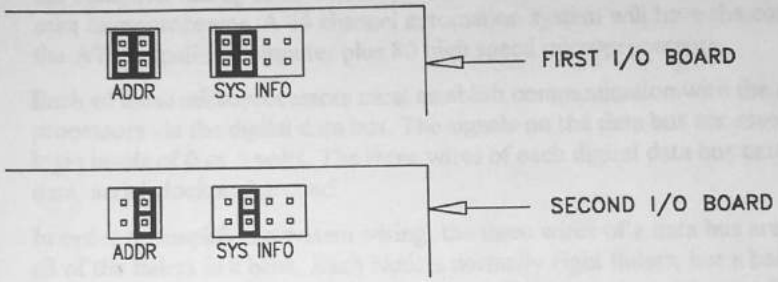


Figure 34 - System With Two I/O Boards

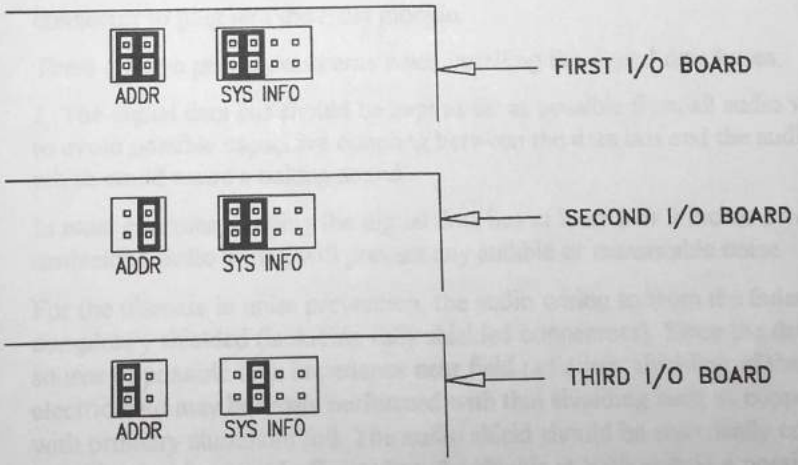


Figure 35 - System With Three I/O Boards

Data Bus Wiring

Data Bus Wiring

The Uptown Automation system uses unique distributed data processing technology. The IBM AT compatible computer is the central processor. Each plug-in I/O board in the computer has up to four microprocessors and each automated fader module has its own microprocessor. A 64 channel automation system will have the combined power of the AT compatible computer plus 80 high speed microprocessors.

Each of these microprocessors must establish communication with the other processors via the digital data bus. The signals on the data bus are essentially digital logic levels of 0 or 5 volts. The three wires of each digital data bus carry the serial data, serial clock and ground.

In order to simplify the system wiring, the three wires of a data bus are shared among all of the faders in a bank. Each bank is normally eight faders, but a bank may have any number from one to nine fader modules. For example, with eight faders per bank, the digital data cable for a 32 channel system consists of 4 three-conductor data cables, each set of three conductors serving one fader bank.

The data is routed from the I/O board to each fader bank via the data cable. The data cable has a DE-9 connector to plug into the I/O board and a 3-pin AMP polarized connector to plug into the fader module.

There are two primary concerns when installing the digital data buses:

1. The digital data bus should be kept as far as possible from all audio wiring. This is to avoid possible capacitive coupling between the data bus and the audio wiring which could cause a ticking sound.

In most consoles, keeping the digital data bus at least 2 or 3 inches away from any unshielded audio wiring will prevent any audible or measurable noise.

For the ultimate in noise prevention, the audio wiring to/from the fader should be completely shielded (including fully shielded connectors). Since the data bus is the source of possible high impedance near field radiation, shielding of the associated electric field may be easily performed with thin shielding such as copper foil or even with ordinary aluminum foil. The audio shield should be electrically connected to console chassis ground. Grounding the shields at both ends is a possible source of ground loops and increased noise, but sometimes it works best. Other times, the shield must be connected to chassis ground only at one end.

2. The digital data bus must have a very low capacitance to ground. The longer the data bus, the fussier it will be about the stray capacitance to ground in your particular installation.

For this reason, we provide special low capacitance #22 AWG ribbon cable with .100 wire-to-wire spacing. The ribbon cable should be kept away from all metal, including the console. A spacing of 1 to 3 mm (.04 to .12 inches) from the ribbon cable to metal through air is recommended. Where the ribbon cannot be suspended in air to keep it away from metal, a spacing of 2.5 to 5 mm (.10 to .20 inches) from the ribbon cable to metal through plastic or wood is also satisfactory. Occasional violations of these guidelines, for an inch here or there, will not degrade the system performance. The cable capacitance from conductor to conductor or from conductor to chassis cannot exceed 150 pF for the entire cable.

Foam tape or foam rubber are excellent spacers to minimize the stray capacitance. (Air is the best available dielectric spacer material. Therefore, foamed plastic materials which contain a lot of air are very good spacers.) Double sided adhesive foam tape, 3 mm (1/8 inch) thick is very convenient as a combination spacer and cable mounting adhesive.

Plastic ribbon cable clamps such as Panduit FCM series which hold the cable flat, but keep it away from the metalwork are often useful. In some cases, the use of molded plastic dielectric spacer material may be more convenient. Such material is manufactured by the Zippertubing Co. (type DS spacer) and 3M (3352-0200).

If shielded cable is required in a particular installation, high performance cable with foamed dielectric will be most suitable. For example, Belden 8132 is a two pair cable which has typically about 11 pF per foot conductor to conductor and about 10 pF per foot capacitance from one conductor to shield. Shielded data cables up to 10 feet long can be built with such special cable.

When using shielded cable, each fader bank should have its own two pair cable. In the two pair shielded cable, the clock should be twisted with a ground line and the data line should also be twisted with a ground line. In general, the use of cables with more than two pairs (one bank) should be avoided due to the potential for crosstalk and subsequent data corruption.

Data Cable Construction

The System 2000 is delivered with a fully tested data cable. The information in this section is provided for reference.

The critical parameters here are the total capacitance from wire-to-wire and wire-to-chassis. Each of these capacitances must be kept below about 150 pF. For that reason, we utilize the .10" spacing ribbon cable and keep it .1" away from chassis using foam core tape or plastic mounting clips. The capacitance from conductor to conductor in the .10" spacing ribbon is about 7 to 10 pF per foot, depending upon the dielectric and the wire gauge.

Suitable ribbon cable is manufactured by Panduit, 3M and other wire suppliers. We normally use Panduit 100F22VxxCR, where the "xx" denotes the number of

conductors. For example, for a 32 channel system there are four fader banks of eight faders, each needing three conductors of data cable, resulting in twelve-conductor ribbon cable which is Panduit 100F22V12CR.

For 150 pF max., that allows a #22 AWG data ribbon cable length of 15 to 18 feet maximum. The use of #28 AWG, .10" spacing ribbon, at 7 pF per foot would theoretically allow up to 20 feet overall length, but we have not tested such a cable.

Virtually any type of cable can be used, but the limit of 150 pF must not be exceeded or erratic performance may result. Such increases in capacitance and the resulting erratic system operation can be caused by folding the ribbon cable back on itself or tightly coiling the excess ribbon cable.

We use wide sections of ribbon cable because of the small size and tidy appearance, but individual ribbons cables or individual shielded cables should provide equivalent performance as long as the wiring is done neatly and the cables are not stacked on top of each other which could cause cross-talk.

Data Cable Direction

The system is normally supplied with pre-wired data bus cables. The data cables may be "right-handed" or "left-handed". A "right-handed" data cable is one that is designed to enter/exit the right side of the console (as you are seated at the console).

concepts

It is important that all of the data bus wiring is installed so that the computer views the fader modules as being installed in sequential order from left to right across the console. If this is not true, many difficulties could occur. The root of the problem is that the numbers by which the MIX program refers to fader modules will not correspond to the fader's actual position in the console, and the results will be very confusing to the user.

testing

The easiest way to verify that the faders are numbered properly is to run the Demo, Wave portion of the SYSTEST program. The wave should begin with the left-most fader module and proceed from left to right across the console.

For information about the SYSTEST program, see the SYSTEST manual.

fixing problems

To determine the correct bank numbering, you have to understand how the bank numbering relates to the I/O boards. Each I/O board can have up to four banks of faders connected, using 2 DE-9 connectors. We label these four banks A, B, C and D. Each DE-9 connector serves two banks. Each bank uses 3 wires, so each of the DE-9 connectors will typically have 6 wires connected.

There can be up to 3 I/O boards installed, so up to 12 banks of faders can be supported. The I/O board jumpers (previously described in the I/O Board section) define which board is which.

The first task is to determine how many banks of faders your system has, and what order they should be in. If you have, for example, 38 faders, you would have 5 banks of faders. This would require 2 I/O boards, with four fader banks on the first board (A, B, C, and D) and 1 fader bank (A) on the second board. After you have

determined the correct order for the system, the next step is to check the data cable. You can refer to the following chart for the wiring required for the data cable. The pins on the red 3-wire AMP connector that attaches to the fader as well as the pins on the DE-9 that plugs into the I/O board are shown to allow testing the data cable prior to installing it. Note that fader banks A and B connect to the DE-9 installed at the top of the I/O board, furthest away from the computer motherboard.

Fader Bank	Amp Pins	DE-9 Pins
A	1	4
	2	9
	3	5
B	1	2
	2	1
	3	6
C	1	4
	2	9
	3	5
D	1	2
	2	1
	3	6

Table 8 - I/O Board Data Cable Wiring

MIDI/SMPTE Board

MIDI/SMPTE Board

The MIDI/SMPTE coprocessor board (simply called the MIDI board) is installed in the computer in order to provide both the MIDI and time code capabilities. The automation system will not operate without the MIDI board properly installed and setup.

The MIDI section of the board has two 16 channel MIDI ports. The time code reader/generator section of the board can read and write 30 frame non-drop, 30 frame drop, 25 frame (EBU) and 24 frame audio track time codes. These time codes are also referred to as Linear Time Code or LTC. The board cannot read VITC video time code.

The MIDI board can be installed in any 8 bit or 16 bit slot of the computer. Do not install the board in a 32 bit slot. DIP switch S1 on the board is used to set the address and interrupt request line. If there are any address or interrupt conflicts due to these switch settings, the automation system will not operate properly.

Fortunately, virtually all IBM AT compatible computers, such as those specified for use with our system, have IRQ5 and address 330 available. Therefore, it is generally possible to simply set the MIDI board with these specific values. If you encounter any problems, please refer to the manual that is shipped with the MIDI board.

The illustration below shows a side view of the MIDI board. There are several important items to notice in the illustration. DIP switch S1 in the illustration is set to IRQ5 and address 330 with switches 3 and 7 turned on and all other switches turned off. The RCA phono connector nearest to the MIDI connector is for the audio time code input. This is an unbalanced input, with the connector shell tied to computer chassis ground. It will work with time code levels at -10 dBm to +4 dBm.

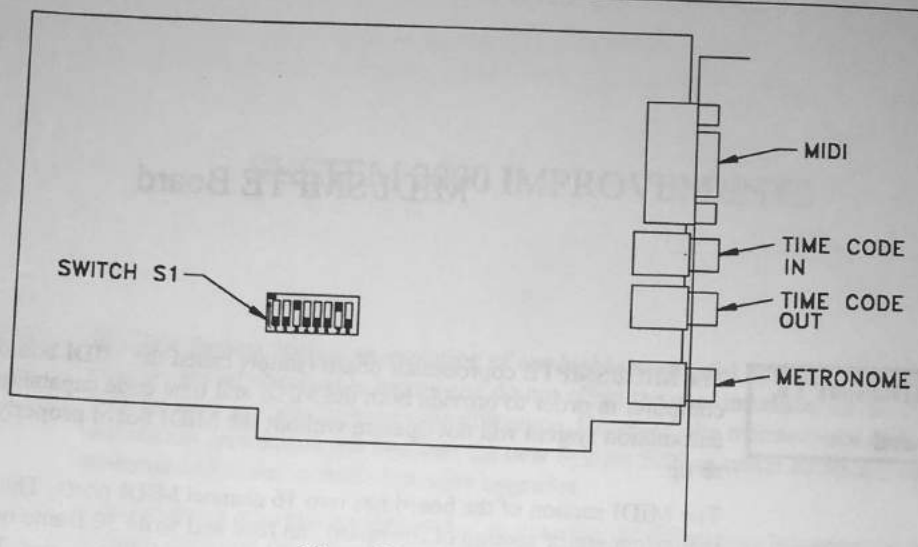


Figure 36 - MQX-32M MIDI Board

SYSTEM 2000 IMPROVEMENTS

SYSTEM 2000

The new System 2000 is an evolution of our highly successful System 2000. The changes are all electrical in nature and do not affect the user interface, so the operator will not have any way to notice the difference. However, the maintenance and installation technicians will find that the new System 2000 is easier to install, easier to maintain and easier to make firmware upgrades.

The following information is provided to describe the differences between the new System 2000 and the older System 2000. Technicians who have to support installations using the new System 2000 and also support installations using the older System 2000 may find this information helpful to avoid compatibility problems.

To identify new System 2000 fader boards, refer to Figure 3 to find out where the model number for the circuit board is. Model number 800 boards are "new", and model number 605 boards are "older" style. If your circuit boards have other model numbers, contact Uptown Technical Support for information about these fader modules.

The major differences are that the new System 2000 has the following features:

- The new System 2000 fader modules have electrically erasable memory chips, called EEPROMs. These permit new firmware to be downloaded into the fader modules directly from the SYSTEST program.

  In the older System 2000 modules, firmware updates required disassembly of the fader module and replacement of the memory chip.

- The new System 2000 fader modules may have the addresses set via the SYSTEST software, which avoids removing modules if you have set a module to a conflicting address.

  In the older System 2000 modules, the fader addresses were set only by means of the address jumpers.

- The new System 2000 fader modules have a 1/2 amp miniature fuse to protect the circuit board from damage if the motor power driver IC is damaged.

In older System 2000 fader modules, a short circuit from the fader control wiring to ground could damage the circuit board if the motor drive IC failed.

Power Supplies and Power Wiring

Power Supply

The System 2000 moving fader automation system uses a rack-mounted power supply to provide the 5 VDC for the logic and the 24 VDC to the fader motors. Each power supply can power up to 40 fader modules.

The mains AC power input is via an IEC connector on the rear of the power supply. The input voltage range must be properly set using the voltage selector on the rear of the power supply.

The Uptown™ model PS 24/5 power supply provides +5 volts at 3 amps maximum and +24 volts at 12 amps max when using 60 Hz mains. (Outputs are derated to +5 volts at 2.5 amps and +24 volts at 10 amps when using 50 Hz mains.) All outputs are protected with automatic current limit/foldback and fuses.

A small, very quiet (23 dBA) fan assures adequate cooling for the power supply. An air space of at least 1/2 inch (12 mm) must be provided above the power supply to assure proper air circulation.

CAUTION
Voltage Selector

The power supply AC input connector assembly contains a voltage selector which allows international operation of the Uptown Automation system. The voltage selector must be properly set at the time of installation. System damage resulting from improperly setting the power supply voltage selector is NOT covered by any warranty, express or implied. The voltage selector may be set for nominal line voltages of 100, 120, 220 or 240 VAC, 50 to 60 Hz only.

Verify that the proper voltage selection number is clearly visible through the fuse holder window before applying AC power.

CAUTION
AC Line Fuse

An AC mains fuse is included in the power input connector. For 100 or 120 VAC operation, the fuse must be a 5 x 20 mm, 6 A, slow-blow. For 220 or 240 VAC operation, the fuse must be a 5 x 20 mm, 3 A, slow-blow. No other type of fuse should be used.

CAUTION
Hazardous Voltages

The power supply enclosure should not be opened. Hazardous voltages are present inside. All service should be referred to qualified personnel.

CAUTION Avoid Moisture

To avoid hazardous conditions, do not subject the power supply to rain or extreme moisture.

CAUTION Use Grounded Outlet

For safety, the power supply must be connected to a properly grounded three-wire AC outlet using a suitable three-wire IEC/CEE line cord. The third wire ground is connected only to the power supply case and to the EARTH terminals on the barrier strips.

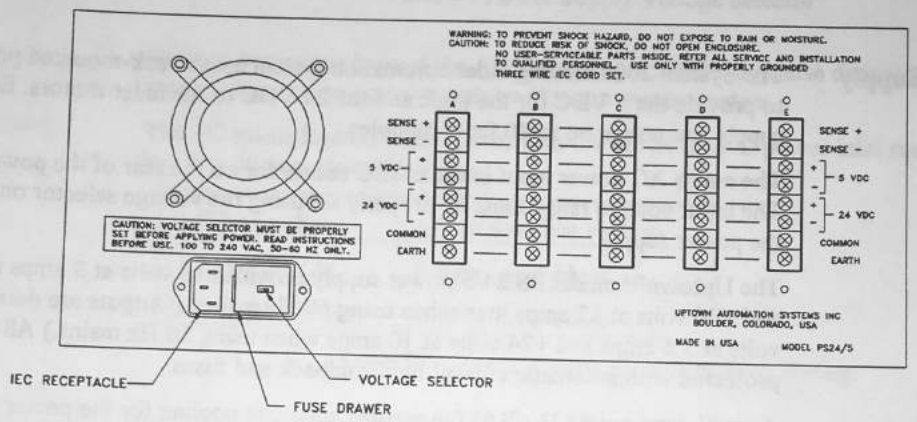


Figure 37 - Rear View of Power Supply

AC Power

The AC power inlet receptacle contains an IEC 320/VI, CEE 22/VI three wire AC power line connector, a four-way voltage selector and a power line fuse.

line cord ground

The AC line cord must be a properly grounded, three wire IEC/CEE-type line cord. The third wire ground from the power cord is connected to the power supply case for safety and is also connected to the EARTH terminals of the power supply barrier strips. The power supply outputs are not connected to the third wire ground.

voltage selector

The input voltage selector must be properly set for the AC power line conditions. Failure to properly set the voltage selector may result in severe damage to the power supply and/or automation system. Such damage is NOT covered by any warranty, express or implied.

To determine the proper voltage selector setting, the AC power line voltage should be measured at various times of the day in order to find what typical line voltage excursions will be encountered. We recommend the use of an accurate (better than +/- 1%), averaging type of AC voltmeter (i.e. NOT a true-RMS meter) for the line voltage measurements. Based upon such line voltage measurements, as performed by qualified personnel, the voltage selector settings are to be as follows:

AC line voltage	Voltage Selector
87 to 110 VAC	100
104 to 132 VAC	120
191 to 240 VAC	220
208 to 264 VAC	240

Table 9 - Power Supply Voltage Selector

Voltage excursions beyond the AC line voltages listed may cause damage and/or malfunctions to the power supply and/or automation system.

AC fuses

The AC mains fuse contained in the fuse drawer of the AC power inlet receptacle must be a 5 x 20 mm, slow-blow fuse:

AC line voltage	AC power fuse rating
87 to 132 VAC	6 Amp, slow-blow
191 to 264 VAC	3 Amp, slow-blow

Table 10 - Power Supply AC Power Fuse Rating

Use of any other fuse type or rating may result in safety hazards, may cause improper operation and will void all automation system warranties.

DC power requirements

Each System 2000 fader module typically requires approximately 30 to 60 milliamps from the +5 volt supply and approximately 35 to 300 milliamps from the +24 volt supply. The 5 volt supply should be set at no-load 5 v ± 0.10 v. Each PS 24/5 power supply is designed for use with up to 40 fader modules.

For a system with 40 fader modules, the typical total current will be 1.4 amps from the +5 volt supply and, if all faders are moving simultaneously, 12 amps from the +24 volt supply. It is of course quite rare in a real mix for all of the faders to simultaneously move at full speed and require full power. In general, the current from the +24 volt supply is very low, but the power supply and the wiring must be capable of handling large currents when required.

Power Supply Front Panel

The AC power on/off switch is located on the front panel. The OFF position is labeled with the international symbol O (zero). The ON position is labeled with the international symbol 1. The following illustration depicts the front panel of the power supply.

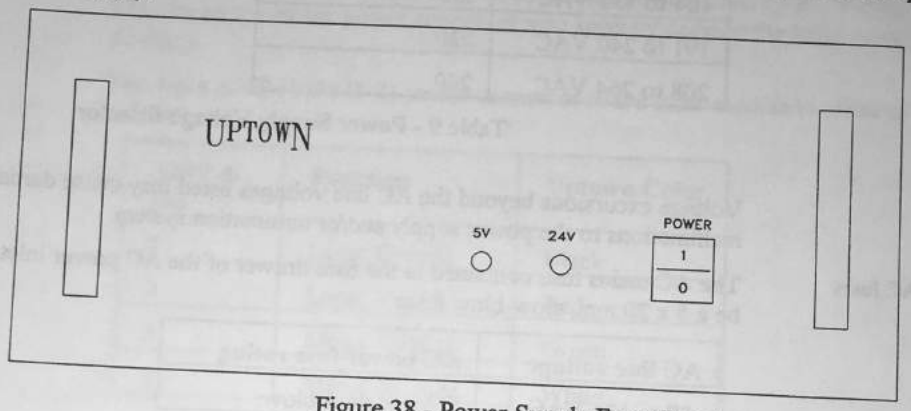


Figure 38 - Power Supply Front Panel

voltage indicators and fan

Also located on the front panel are two green LED output voltage indicators. The 5 V LED is powered by the 5 volt DC power supply. If the 5 volt power supply is operating normally, the 5 V LED will be illuminated. If the 5 volt power supply is shut down due to an external short circuit, blown fuse or power supply failure, the 5 V LED will be off.

Similarly, the 24 V LED is powered by the 24 volt DC power supply. If the 24 volt power supply is operating normally, the 24 V LED will be illuminated. If the 24 volt power supply is shut down due to an external short circuit, blown AC line fuse or power supply failure, the 24 V LED will be off. The power supply cooling fan is also powered from the 24 volt power supply.

Construction of the Power Cable

The System 2000 is shipped with DC power cables. This information is provided for reference.

There is nothing known to be critical about the power wiring. We normally use shielded wire just as a precaution, but the fader modules should not really make much noise on the power wiring.

The System 2000 fader modules typically need very low current from the 5 volt logic supply, about 35 milliamps typical, 60 milliamps max.

The 24 volt motor power supply wiring will carry 300 milliamps max. per fader motor, or 2.4 amps max. per bank of eight faders. The wire size should assure that at full power, the voltage drop due to the power cable is not greater than about 1 or 2 volts. Excessive voltage drop will make the faders sluggish. The motor power supply

which we provide is set for 24 volts and is capable of providing up to 12 Amps, thus being capable of supplying power to as many as 40 fader modules.

The power connector on each fader module requires 4.80 to 5.20 volts for the logic supply and requires 24 volts ±10% for the motor power. CAUTION: Voltages above 27 volts on the motor power connector may severely damage the fader module circuitry.

The 4-pin AMP (102241-2) power connector to the fader module is wired as follows:

AMP 4-pin	Function	Uptown Color
1	Logic Ground	Black
2	Logic 5 volts	Red
3	Motor Ground	Green
4	Motor 24 volts	White

Table 11 - Fader Module Power Connector Wiring

power supply size

The Uptown™ model 24/5 power supply is designed for use with up to 40 System 2000 automated faders. The power supply is intended to be mounted in a standard 19 inch rack. The supply is 7 inches (4 rack units) tall, extends 14 inches behind the front panel and weighs approximately 35 pounds. The handles on the front extend 1 3/4 inches out from the front panel.

Power Wiring

In order to simplify wiring and avoid massive power cables, the fader modules are powered in banks of 8 modules. The power distribution and the digital data bus each use one cable for each bank of 8 fader modules.

Each bank of 8 fader modules must have a power distribution cable connected to one of the barrier strips on the back of the power supply. All of the barrier strips are functionally identical. For ease of reference, the letters A through E are printed above the barrier strips. No more than 16 faders should be powered from any one barrier strip due to the fuses for each barrier strip.

local wiring codes

The power supply wiring should be done in accordance with all appropriate statutes and codes. Consult a qualified electrician to determine the specific requirements in your area. Uptown Automation Systems Inc. makes no claims or recommendations concerning power wiring and all responsibility for compliance with statutes and codes rests with the purchaser and/or installer.

Our standard power distribution cable, Carol Cable C0762, is a PVC jacketed, foil shielded, 4-conductor #22 AWG cable. This cable is rated NEC Article 800 type CM, NEC article 725 type CL2, UL style 2464, and passes the UL 70,000 BTU vertical flame test. For a typical installation in the USA, this type of cable is,

according to the manufacturer, generally suitable for use in a fully enclosed raceway or conduit, non-concealed runs of 10 ft or less, concealed runs in walls, or non-plenum ceiling runs.

The 22 AWG power distribution cable is designed for runs up to 12 meters (40 feet) maximum. For longer runs, a larger wire size is required. Contact Uptown Automation for specific information regarding wire size for runs longer than 12 meters (40 feet).

shielding

The power distribution cable is shielded to help prevent noise from being coupled into the console or other nearby equipment. One end of the shield should be connected to system common at the power supply, the other end of the shield should be trimmed neatly and not connected to anything. This type of single-point grounding of the shield is recommended to avoid ground loops and possible resultant hum problems.

barrier strip wiring

The following illustration depicts the wiring at the back of the power supply for a typical 32 channel System 2000 installation.

Since there is an individual 5 amp fuse for the 24 volts on each barrier strip, you should never connect more than two fader banks, or a total of 16 faders, to any one barrier strip.

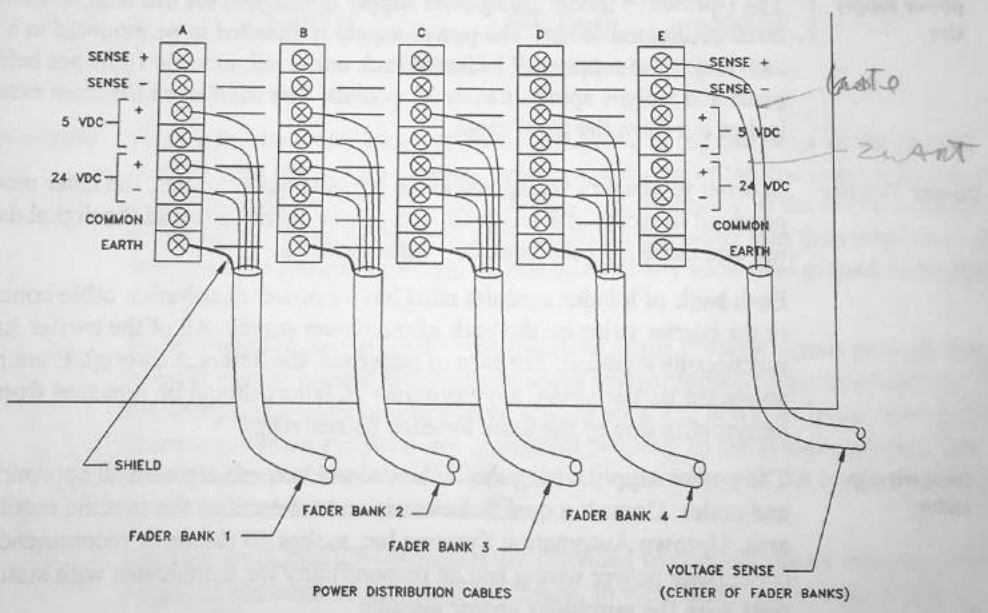


Figure 39 - Power Supply Wiring

barrier strip labeling

Please note that the positive terminal of the 5 volt power supply is labeled 5 VDC +. The 5 volt supply negative terminal, also often called return or ground, is labeled as 5 VDC -. The total no-load voltage measured between these two terminals is 4.9 to 5.1 volts.

Similarly, please note that the positive terminal of the 24 volt power supply is labeled 24 VDC +. The 24 volt supply negative terminal, also often called return or ground, is labeled as 24 VDC -. The total voltage measured between these two terminals is 23.0 to 24.0 volts .

The following table defines the signal name and power cable color code used for each terminal on the barrier strip.

Supply Terminal	Signal Name	Color Code
5 VDC +	+5	Red
5 VDC -	Digital Gnd	Black
24 VDC +	+24	White
24 VDC -	Power Gnd	Green
COMMON	Digital Gnd	unspecified
EARTH	IEC Earth	unspecified

Table 12 - Power Cabling Color Code

console chassis ground

Ordinarily, the automation system uses the case of the computer as the ground reference for the system. In most instances, the case of the computer is tied to the third wire ground in the 3 pin IEC AC mains power connector. If the console chassis is tied to the same ground as the third wire ground of the outlet that the computer is plugged into, then the grounding should be fine without any additional ground wiring to the computer.

If the computer case ground is not the same as the console chassis ground, then a console chassis ground for the automation system should be accomplished by tying the computer chassis to the console chassis with #12 AWG or larger stranded wire. If the automation system is not connected properly to the console ground, it is possible that problems may be encountered, especially with the touch sensors on the faders and the data communications.

The system COMMON terminals are provided to connect the automation power supply to the console ground if necessary. In most cases, the system connection to the console chassis should be made only at the computer to avoid ground loops.

The COMMON terminals on the barrier strip are all connected to each other and are also connected to the digital ground (5 VDC -) inside the power supply. The COMMON terminals are not in any way connected to the power supply chassis or to earth ground. The outputs of the supply are fully floating and must therefore be

referenced to console chassis ground in order for the system to operate properly. This ground reference is normally provided through the computer data cable, which is tied to the computer chassis ground, which in turn is tied to the console chassis.

If a console ground or earth other earth ground is not connected to the system, such as during bench testing without a computer data cable attached, you may have to connect one of the COMMON terminals to one of the EARTH terminals to provide a suitable ground reference. The EARTH terminals on the barrier strip are all connected directly to the safety earth (ground) pin of the IEC AC power line connector.

CAUTION improper wiring

Improper wiring of the system, a reversed connector, or a connector on the wrong pins may severely damage the fader control electronics and/or computer I/O board. Such damage is not covered by any warranty express or implied. All power distribution cables and bank bus cables should be very carefully double checked before applying power to the system. If you have any questions, please check with your dealer or call Uptown Automation Technical Support for assistance.

power connector wiring

The following table defines the signal name, power cable color code and connector pin number for each of the power cable wires.

Supply Terminal	Connector pin	Signal name	Color code
5 VDC +	2	+5	Red
5 VDC -	1	Digital Gnd	Black
24 VDC +	4	+24	White
24 VDC -	3	Power Gnd	Green

Table 13 - Power Cable Connector Wiring

Audio Noise Prevention

There are two possible types of audio noise which could be produced by improper installation of the Uptown Automation system. First, ground loops in the power supply and/or computer wiring could cause audio hum. Second, improper routing of the audio wiring, power supply wiring or digital data bus could result in audio noise which might cause a ticking or whining sound.

routing of wiring

The power and data bus wiring for the fader modules should be kept as far as possible from all audio wiring.

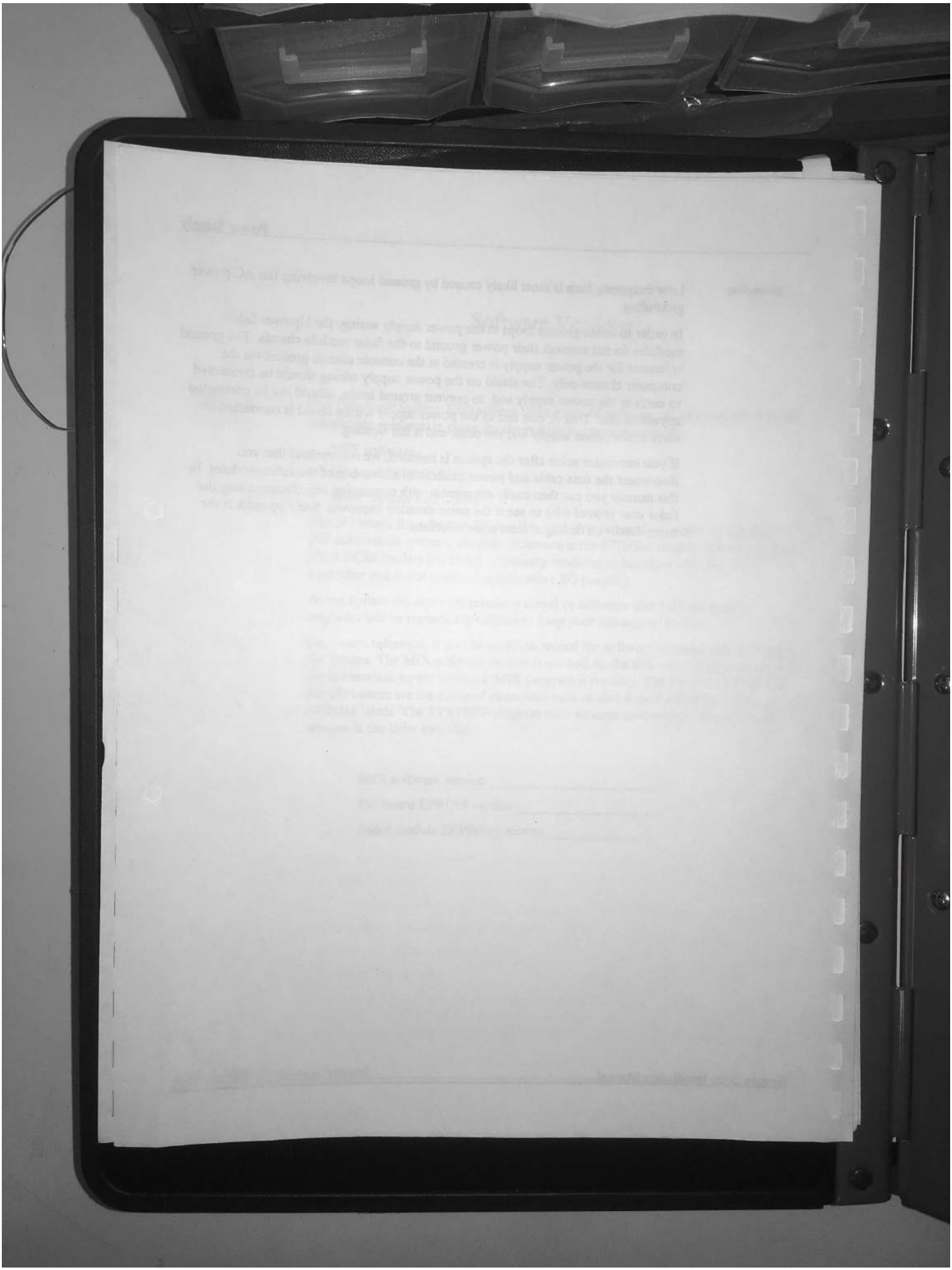
In a typical console installation, the audio wiring to/from the fader will be located at the top of the fader module. Therefore, to keep the power and data wiring as far from the audio as possible, we recommend that the power and data wiring be dressed neatly and fastened to the console chassis near the bottom of the fader, as far as possible from the audio wiring.

grounding

Low frequency hum is most likely caused by ground loops involving the AC power grounding.

In order to avoid ground loops in the power supply wiring, the Uptown fader modules do not connect their power ground to the fader module chassis. The ground reference for the power supply is created at the console chassis ground via the computer chassis only. The shield on the power supply wiring should be connected to earth at the power supply and, to prevent ground loops, should not be connected anywhere else. That is, one end of the power supply wiring shield is connected to earth at the power supply and the other end is left floating.

If you encounter noise after the system is installed, we recommend that you disconnect the data cable and power cable from all but one of the fader modules. In this manner you can then easily experiment with connecting and disconnecting the fader case ground wire to see if the noise situation improves. See Appendix B for more details on finding system noise solutions.



Software Versions

Software Versions

The Uptown™ System 2000 utilizes three types of software, all of which must be of compatible versions, in order for the system to operate properly.

- MIX software
- I/O board EPROMs
- Fader module EEPROMs

The I/O board for a System 2000 is the same circuit board as used with our System 990 automation systems, the only difference is the EPROM version. (However, in a DDA DCM the last I/O board is specially modified to interface with the DCM controller and is not compatible with other I/O boards.)

As we update the firmware (memory chips) or software (the MIX program), upgrades will be periodically offered to keep your systems up to date.

For future reference, it may be useful to record the software versions as you unpack the system. The MIX software version is marked on the diskette and also appears on the automation screen while the MIX program is running. The EPROM versions of the I/O boards are the string of characters such as 2B4.8 on the first line of the EPROM labels. The SYSTEST program must be used to determine the firmware version in the fader modules.

MIX software version _____

I/O board EPROM version _____

Fader module EEPROM version _____

EPROM Versions

The following illustrations show where to find the EPROM version codes on the I/O boards:

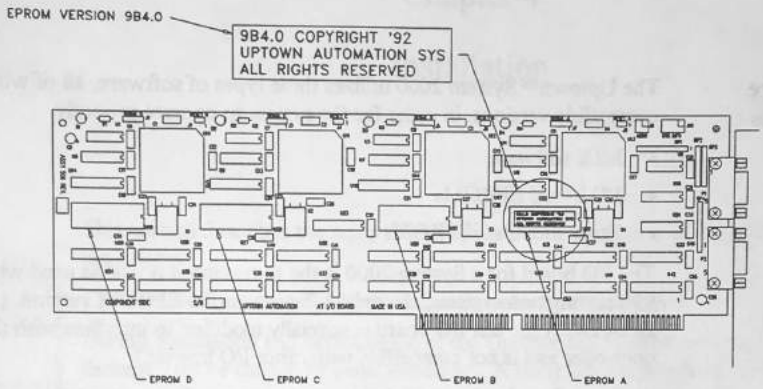


Figure 40 - EPROM Version for I/O Board EPROMs

EEPROM Versions

The fader modules utilize electrically reprogrammable memory ICs, so the label on the IC is not necessarily up to date. The only way to positively determine the version of the firmware in the fader modules is to use the SYSTEST program.

To determine the firmware versions in the fader modules, use the System Information, Fader Version menu command in SYSTEST.

Chapter 4

Installation

This section describes the setup of the System 2000 computer and final checkout of the system.

CAUTION Static Electricity

CAUTION: static electricity can damage electronic circuitry.

During installation and maintenance of the Uptown automation systems, serious damage may be caused by static electricity. A static discharge which cannot even be felt by a person can cause permanent damage to the system. Some types of static damage will not result in immediate failure, but will gradually degrade performance, perhaps resulting in intermittent problems.

During system installation and/or maintenance, extreme caution should be exercised to avoid static electricity. Use an anti-static spray such as Staticide (available from computer supply or office supply stores) on floors, chairs and clothes. If the humidity is low, the use of a humidifier is recommended. For the best protection against static damage, we recommend that you wear a grounded wrist strap while handling components of the system.

Installation Overview

In this section, the complete installation of a typical Uptown Automation system will be described. Our goal here is to present the steps which will lead to a successful, fully operational system installation. These installation steps assume that you have become familiar with, and will refer to as needed, the technical details of the system which have been presented in Chapter 3, the Hardware Reference Guide.

Installation of the Uptown automation system consists of:

- Setting up the computer and software
- Installing the power supply
- Installing the faders modules in the console
- Installing power and data cables
- Wiring the mutes

The following installation procedure is designed to minimize the down-time of your studio. The major factor in minimizing the down-time is to install and preliminarily test the computer and power supply before the automated fader modules are

installed. Another important factor is to carefully test the mute switch operation and mute control wiring on one channel before wiring the entire console.

Before beginning the installation, you should have resolved the issues raised in Chapter 2, Pre-Installation Planning.

Setting up the Computer

If you have purchased a fully setup computer from Uptown, the I/O boards, MIDI/SMPTE board and MIX software have already been installed and fully tested so you can skip the following computer setup instructions. However, you may have to alter or add appropriate environment variables for synchronizer port assignment and control panels to complete your setup. Everything else, such as the DOS installation, memory manager, Uptown software installation, AUTOEXEC.BAT setup, normal DOS environment variables, CONFIG.SYS and trackball setup, will already have been done and checked prior to you receiving the computer with your system

So, if you have a computer that we have already setup, skip the following initial setup section and proceed to the final set up section on page 86.

Initial Setup

If you are using a computer which we have not set up, you'll need to perform the following computer setup steps. This initial computer setup may be done outside of the studio environment, if desired, to keep studio downtime to a minimum.

The computer must meet the general specifications given earlier on page 3.

Operating System Setup

The first phase of computer setup is to follow all of the computer manufacturer's instructions for unpacking and setup. On a 386 or 486 computer, this often includes the installation of an expanded memory manager, such as the DOS 5.0 utility EMM386. Our instructions will describe installation with DOS 5.0 and EMM386, so if possible you should use DOS 5.0 or newer. When the computer is happily running, you should install the trackball (or mouse) according to manufacturer's instructions.

DOS

We recommend using Microsoft DOS 5.0 or newer. The normal setup includes installing EMM386.EXE and HIMEM.SYS. DOS is loaded high, and UMBs (Upper Memory Blocks) are enabled. When the MIX software is loaded, sample CONFIG.SYS and AUTOEXEC.BAT files are placed in the \MIX directory.

These files can be used as models for your PC setup or copied to the root directory and modified as needed. Under the rules of DOS, whenever the computer is booted, only the CONFIG.SYS and AUTOEXEC.BAT files in the root directory are executed. Any files by the same names in other directories will not be processed.

expanded memory

Expanded memory is required to do mixes that have more than a few faders moving for longer than a few minutes. It is recommended that at least 1 megabyte of expanded memory is available for the Uptown system.

A memory manager such as Microsoft's EMM386.EXE is recommended to provide the expanded memory support.

The automation system saves 6 bytes of data for each channel every frame that there is a change in progress on that channel. No data is stored for a channel when that channel does not have any movement or any switch changes.

mouse driver software

If you are using a mouse or trackball with the system, you must install the mouse driver software. If you have installed DOS HIMEM.SYS, you can load the mouse driver software in high RAM (UMBs) to make the greatest amount of conventional system RAM available. Refer to the DOS manual for this procedure.

directory

Make sure you are modifying the correct copies of the files. Most Uptown systems have copies of the CONGIG.SYS and AUTOEXEC.BAT files in the C:\ directory *and* the C:\MIX directory. Only the root directory (C:\) files are read by DOS at boot-up, so these are the files that need to be modifed.

editing files

DOS 6.00 has a built-in file editor. To activate it, first change to the root directory by typing

```
cd \<Enter>
```

and then type either

```
edit config.sys<Enter>
```

or

```
edit autoexec.bat<Enter>
```

You can use the arrow keys to position the cursor in the file, and then press the <Enter> key to add lines, or use the backspace and <Del> keys to delete text.

When you are finished editing the file, type

```
<Alt>+F
```

to bring down the File menu, then press

```
x
```

to exit. A prompt box will appear, so press

```
<Enter>
```

to confirm that you want to save the file.

You must re-boot the computer (by pressing <Ctrl>+<Alt>+<Del> or by turning it off and on again) to see the effects of any changes you have made to the files.

CONFIG.SYS file

This is a typical CONFIG.SYS file for use in DOS 6.00:

```
BUFFERS=20
FILES=20
```

```
SHELL=C:\COMMAND.COM /P /E:256
DOS=HIGH,UMB
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE 2400 MIN=2400 RAM
```

The only difficult thing here is determining the number for the expanded memory field (2400 in this example). Note that the expanded memory number must appear in two places on the line. The MIN field is needed because without it DOS 6.00 can incorrectly report the amount of expanded memory that will be available to a program.

The goal here is to allocate all extended memory as expanded memory, except for a 256k block of memory that will be used by the SMARTDRV disk caching software.

To determine the correct number for expanded memory in your system:

1) In order to have the boot process stop so that you can read the screen, insert a line in the AUTOEXEC.BAT at the first line in the file that reads

```
PAUSE
```

PAUSE is a command that will stop the processing of the AUTOEXEC.BAT file and prompt you to press a key to continue.

2) Start with a larger number than you expect to end up with. On machines with up to 8 megs of RAM installed, you can use 8000 for you starting number.

3) Re-boot the computer by pressing <Ctrl>+<Alt>+<Del>.

4) If the EMM386 program displays the message

```
Size of expanded memory pool adjusted.
Press any key to continue...
```

press any key and then read the number on the line that says

```
Available expanded memory . . . . . 2768
```

Write down the number on the end of the line (2768 in this example), and subtract 256 from it and change the number in the CONFIG.SYS file EMM386 line to it. Remember to change the number in both places.

5) Re-boot again. EMM386 may decide to change the size of the expanded memory pool once more (it will be slightly smaller). If it does, again modify CONFIG.SYS, but now enter the number that EMM386 has suggested (do not subtract 256 this time). Continue with this process until EMM386 no longer issues the "Size of expanded memory pool adjusted" message.

6) Remove the PAUSE line from the AUTOEXEC.BAT file.

autoexec.bat file

Here is a typical AUTOEXEC.BAT file under DOS 6.00:

```
PROMPT $P$G
PATH=C:\DOS
C:\DOS\SMARTDRV c 256
LOADHIGH C:\LOGITECH\MOUSE
SET CONTROL_PANELS=1
SET LYNX=2
CD \MIX
MIX
```

A few things to note about this file. The SMARTDRV command contains the letter of the hard disk drive. This prevents write-back caching of the disk drive. The 256 indicates that the cache should be 256k.

The three set commands are examples only, they will vary from system to system.

This AUTOEXEC.BAT file automatically starts the MIX program at boot-up.

backup files

It is a good idea to create an emergency boot disk in case you ever lose data on your hard disk drive. If you follow the steps below after your computer is up and running properly, you will be able to re-create the hard disk state if the hard disk has crashed or data has been lost.

1) Find a floppy that is the highest density that will fit in our A: floppy drive. On most modern PCs, this is either a 3 1/2" 1.44meg floppy or a 5 1/4" 1.2 meg floppy.

2) Insert the floppy disk, and type

```
format a: /s /u<Enter>
```

and press `<Enter>` again at the prompt. Formatting will take a minute or two.

Press `<Enter>` once again and then `N` to exit the format program.

3) Copy the boot files:

```
copy c:\config.sys a:<Enter>
copy c:\autoexec.bat a:<Enter>
```

4) Create a MIX directory on the floppy:

```
md a:\mix
```

5) Copy the contents of the mix directory on the hard disk to the floppy disk.

```
copy c:\mix a:\mix
```

Label this disk and put it in a safe place.

I/O Boards

After the computer has been setup and is running happily, the Uptown I/O boards may be installed. There is one Uptown™ I/O board required to communicate with each four fader banks (usually 32 faders) that are installed in the system. Each I/O board requires a 16-bit full-length slot in the PC. 16-bit slots have a double edge-card connector, while 8-bit slots have a smaller, single edge-card connector. The automation system will require one, two, or three I/O boards, depending on the number of faders installed.

Do not install the I/O boards in 32-bit slots. These slots often work only with memory cards, and could cause the computer to fail to boot up.

setting the jumpers

Each I/O board has several jumpers. The address and system information jumpers must be properly set on each I/O board for the computer to establish proper communications. Each I/O board has 2 DE-9 data bus connectors, which each support 2 fader banks, allowing each I/O board to communicate with up to four fader banks (32 faders typically).

It is a good idea to check the jumpers on the I/O boards at this time to see that they are set correctly for your system configuration. See Figures 33, 34, and 35.

MIDI/-SMPTE Board

Each Uptown system requires one MIDI/SMPTE co-processor board. This section describes the setup and installation of the board.

find the interrupt number

In most AT compatible computers, interrupt 5 is available and is recommended as the normal system configuration. If you use another interrupt, the environment MIDI_NUM must be set to tell the software where to find the MID/SMPTE interrupts.

If you have tried interrupt 5 and found it unacceptable, or if you wish to test the computer interrupts before installing the MIDI/SMPTE board, you must find an interrupt which is not being used by another device in the computer. This can be done by running the program MQDIAG, found on the disk that comes with the MIDI/SMPTE board, before the MIDI/SMPTE board is installed in the system.

MQDIAG will show you on the bottom of the screen a set of interrupt numbers, and IRQ status. Choose a number that is marked "UNUSED". The numbers which can be set on the MIDI/SMPTE board are IRQ2, 5, 7, or 9.

set the midi board switch or jumper

Set the switch on the MIDI/SMPTE board to the desired IRQ number. See the installation manual for the MIDI/SMPTE board for information on how to set the switch. The MIX program assumes IRQ5 unless you set an environment variable to tell it to use another interrupt number.

The normal dip switch settings for the MIDI/SMPTE board have switches 3 and 7 ON, all other switches OFF. This sets the address to 330 and the IRQ line to IRQ5. This setup generally works on AT type computers.

install the midi board

The MIDI/SMPTE board can now be plugged into any 8- or 16-bit slot in the PC. Since it is a short board, you can plug it into any 8 bit slot or 16 bit slot on the motherboard. Do not install this board into a 32-bit slot.

Installing the Mix Software

To install the mix software, place the Uptown MIX software diskette in drive A: or B:, change to the desired floppy drive by typing A:<ENTER> or B:<ENTER>, and then type INSTALL<ENTER>. The installation program will check the computer hardware, and then ask you on which disk drive to install the program. Type the letter for the hard-drive that you choose. (Typically drive C).

The MIX software and some utility programs will then be installed in the MIX directory on the disk drive you specified. In order to assure that all of the CONFIG.SYS and AUTOEXEC.BAT commands are currently in effect, it is best to reboot the computer before proceeding to test the computer.

Configuring the Software

The MIX software should be initially tested to verify that the computer will run the software properly.

In order to start the MIX program, type MIX <ENTER>. If you get the message "Bad command or file name", it probably means that you are not currently in the MIX directory. Check your AUTOEXEC.BAT file to determine why you are not in the \MIX directory. Correct your AUTOEXEC.BAT file, reboot and try again to start the MIX program.

When the mix program starts, the first screen will be Initialization Screen which is displayed while the MIX program determines what system resources are available and attempts to establish communications with the I/O boards, the fader modules, the MIDI board and a synchronizer. After the initialization screen, there will be a yellow warning message which tells if the number of faders found (none at this point) does not match the number expected. Click on the Ok box using the trackball or type O on the keyboard to move on to the next screen.

Now, the purple System Configuration screen should tell what was found during the MIX program initialization. Click on the Ok box using the trackball or type O on the keyboard to move on to the next screen. Now, the main automation screen should be displayed. The series of items across the top of the screen is called the menu bar and these items may be selected by clicking on them with the mouse or typing the highlighted letter on the keyboard. Take a moment now to make certain that the mouse works properly. Clicking the left mouse button should select a menu item. Clicking the right mouse button should start the on-line help system.

Environment Variables

In order for the MIX software to operate with the System 2000, you must have set the required environment variables, preferably in the AUTOEXEC.BAT file.

Final Setup

If you have purchased a computer from us, the initial setup items above have already been completed. The final setup of the computer involves checking that the environment variables in the AUTOEXEC.BAT file are appropriate, connecting MIDI devices if desired, connecting SMPTE time code, and connecting the synchronizer.

environment variable tutorial

The following information concerning environment variables is a bit of a tutorial for those unfamiliar with DOS. There are several DOS environment variables that can affect the operation of the automation system. The text editor EDIT is a part of DOS 5.0 and can be used to edit the environment variables in the AUTOEXEC.BAT file.

Change to the root directory by typing

CD \<ENTER>>

and then type

EDIT AUTOEXEC.BAT<ENTER>

at the DOS prompt to start the text editor. To set an environment variable, at the DOS prompt type

SET variable=number<ENTER>

Where "variable" refers to the environment variable you wish to set, and "number" refers to the value you wish to assign to the variable. To see what variables have been set, and are currently in effect, type

SET<ENTER>

To remove an environment variable that has been set, type

SET variable=<ENTER>

Environment variables are all cleared from memory when the computer is turned off, so variables that are useful are generally set automatically by the AUTOEXEC.BAT file. To do this, just include the individual SET commands in the AUTOEXEC.BAT file in the root directory.

System 2000 Environment Variables

The System 2000 software recognizes the following environment variables, which must be in your computer AUTOEXEC.BAT file. All of the environment variables should be entered as all capital letters. There must not be any space before or after the "=" sign.

control panels

In order for the control panel switches to be interrogated and processed, the MIX software must be informed that the system includes a control panel. For use with the System 2000 CP-1 or CP-3 control panels, type

SET CONTROL_PANELS=1

To use a CP-2 (24-button) control box, type

SET CONTROL_BOX=n

where 'n' is the number of the serial port into which the control box is plugged.

SYNC_PORT

Unless another synchronizer is specified by setting its DOS environment variable, the MIX program tests the serial ports COM1 and COM2 to try to find an attached Adams-Smith Zeta-Three synchronizer. The SYNC_PORT environment variable can be used to override this behavior and speed the system initialization process. If SYNC_PORT is set to 0, the synchronizer search will not be done at all, and even if a synchronizer is present it will not be found by the system. If SYNC_PORT is set to 1 or 2, the program will try to communicate with the Adams-Smith synchronizer only on port COM1 or COM2, respectively.

If no Zeta-Three (or any other synchronizer) will be controlled by the MIX program, the MIX program will start up more quickly if you add this statement to the AUTOEXEC.BAT file:

SET SYNC_PORT=0

In general, we recommend that the trackball (mouse) be installed on COM1 and the Zeta-Three installed on COM2. Then the environment variable for the Zeta-Three will be:

SET SYNC_PORT=2

Motionworker

In order for the MIX program to properly control the Motionworker, it is necessary to set an environment variable which tells the MIX program that there is a Motionworker and which COM port on the computer is connected to the Motionworker. The Motionworker must be internally set for RS232 communications.

In general, we recommend that the trackball (mouse) be installed on COM1 and the Motionworker installed on COM2. Then the environment variable for the Motionworker on COM2 will be:

SET MOTIONWORKER=2

If for some reason the Motionworker must be installed on a serial com port other that COM2, then the environment variable for the Motionworker would be:

SET MOTIONWORKER=n, where n=the com port number.

Sony 9-pin Interface

The MIX program can control a Sony device that is compatible with the Sony 9-pin interface. Normally only one Sony device can be controlled by the MIX program. To tell the MIX program to use Sony protocol, the SONY environment variable must be set.

In general, we recommend that the trackball (mouse) be installed on COM1 and the Sony interface be installed on COM2. Then the environment variable for the Sony device on COM2 will be:

SET SONY=2

If for some reason the Sony device must be installed on a serial com port other that COM2, then the environment variable for the Sony device would be:

SET SONY=n, where n=the com port number.

Timeline Synchronizers

The Micro Lynx synchronizer can be controlled directly by the MIX program by connecting a serial cable from a COM port on the PC to the RS232 port on the Micro Lynx. To control other Timeline synchronizers, a System Supervisor Unit (SSU) is required.

In order for the MIX program to properly control the Micro Lynx or SSU, it is necessary to set an environment variable which tells the MIX program that there is a Timeline synchronizer present and which COM port on the computer is connected to the synchronizer. The Micro Lynx must be internally set for RS232 communications.

In general, we recommend that the trackball (mouse) be installed on COM1 and the Timeline synchronizer installed on COM2. Then the environment variable for the Micro Lynx or SSU on COM2 will be:

SET LYNX=2

If for some reason the synchronizer must be installed on a serial com port other that COM2, then the environment variable for the Micro Lynx or SSU would be:

SET LYNX=n, where n=the com port number.

MIDI_NUM

Normally, the MIX program assumes that the MIDI board will be set to use IRQ5. The MIDI_NUM environment variable is used to override use of IRQ5 if for some reason IRQ5 is not compatible with some specific computer. In general, the AT compatible computers have IRQ5 available for use by the MIDI board and IRQ5 is our normal setup.

This environment variable would only be necessary if the MIDI board was installed with the IRQ set to something other than IRQ5.

MONO-CHROME

The MONOCHROME environment variable may be used to alter the color scheme used by the MIX program to make the display more readable when using a monochrome display, such as the display used with laptop VGA computers. The two possible settings are:

SET MONOCHROME=1

or

SET MONOCHROME=2

Experiment to see which of these values produces the best results.

MIDI Connectors

There are several connectors on the back of the MIDI/SMPTE board. These protrude out the back of the computer. See the illustration of the connectors on page 64 in the MIDI/SMPTE section of Chapter 3.

Plug the 9-pin to MIDI cable adapter supplied with the board into the 9-pin connector on the MIDI/SMPTE board. Then you can connect either MIDI out plug to any devices you wish to control by MIDI.

Connect the source of time code (typically the output of track 24 on the tape machine, or perhaps the output of a synchronizer) to the phono jack nearest to the 9-pin connector.

If you are using a synchronizer, the recommended time code wiring is to connect the output of track 24 of the tape machine to BOTH the input of the MIDI/SMPTE board (RCA phono jack nearest the 9-PIN connector) AND the master time code input of the synchronizer.

If you want to be able to stripe tape from the automation system, plug a cable into the middle RCA phono jack on the board and connect it to the tape machine input (normally track 24) or the patch bay to route to the tape machine input.

Adams-Smith Synchronizer

If you are connecting an Adams -Smith Zeta III synchronizer to the system, follow these steps.

make a serial cable

You will need to make a cable to connect the synchronizer to the computer. It will be a 3-wire cable, with serial connectors on each end.

The ground pin is connected on both ends. We recommend use of a shielded cable with the shield connected at one end only. Various different computers have different types of serial port connectors, either 9-pin male or a 25-pin male connector. The following charts show how to build a serial cable for either type of serial port to connect to an Adams-Smith Zeta III synchronizer. Note that this chart assumes that the serial I/O board in your computer follows normal PC conventions for DTE and DCE wiring.

DB25	Zeta
2	2
3	3
7	5

Table 14 - Zeta-Three DB25 Pinout

DE9	Zeta
2	3
3	2
5	5

Table 15 - Zeta-Three DE9 Pinout

connect to the serial port

Connect the cable to an unused serial port on the computer. The MIX program will search serial ports COM1 and COM2 and select the correct serial port automatically. You should set the SYNC_PORT environment variable to tell the computer whether the synchronizer port is COM1 or COM2 to speed up the process of the computer initially finding the synchronizer. If SYNC_PORT is not set, the computer will take a few moments to attempt to determine if a synchronizer is connected to either COM1 or COM2.

set comm parameters

For proper communications with the automation computer, you need to set up the synchronizer serial protocol as follows:

computer port on
RS232 communications
19200 baud
8 data bits
1 stop bit
no parity

Adams-Smith Zeta-Three setup

On the Adams-Smith Zeta-Three, select the "system" menus by pressing the DISPLAY SELECT key until one of the Z selections are shown, such as Z-GO. Now press MENU to go to the parameters that can be set, and then press the /\ key until you reach COMPUTER PORT. Now press MENU to get to the parameter, and then press /\ until ON or Adams-Smith RS232 is displayed. Now press CAPTURE to save this new value.

Now press PREV [SHIFT MENU] to go back to the COMPUTER PORT selection, and press /\ until you reach BAUD RATE. Press MENU to go to the parameter, and press /\ until 19200 is shown, and press CAPTURE to save the new value.

Now press PREV [SHIFT MENU] to go back to the BAUD RATE selection, and press /\ until you reach RS232 FORMAT. Press MENU to go to the parameter, and press /\ until 8 NONE 1 is displayed (this may be the default), and press CAPTURE to save the new value.

The Zeta-Three is now set up to communicate with the MIX program. The settings you have recorded are saved in non-volatile memory and will not be lost after you power-down the Zeta-Three.

Motionworker

If you will be using a Motionworks Motionworker in your system, you will need to verify that your Motionworker has serial port 3 (JR8) set up for RS232 communications. Most are shipped with RS422 communications and require some internal jumpers for RS232 operation.

make a serial cable

You will need to make a cable to connect the Motionworker to the computer. It will be a 3-wire cable, with serial connectors on each end.

The ground pin is connected on both ends. We recommend the use of a shielded cable with the shield connected at one end only. Computers may have a 9-pin male or a 25-pin male serial port connector. The following charts show how to build a serial cable for either type of serial port to connect to serial port JR8 of your Motionworker. The cable length should not exceed 4 m (12 feet) unless special low capacitance cable is used. Note that the following charts assumes that the serial I/O board in your computer follows normal PC conventions for DTE and DCE wiring, if not, you'll need to swap pins 2 and 3 in the computer connector.

DB25	Motionworker JR8
7	1 Gnd
2	3 Transmit
3	5 Receive

Table 16 - Motionworker DB25 Pinout

DE9	Motionworker JR8
5	1 Gnd
3	3 Transmit
2	5 Receive

Table 17 - Motionworker DE9 Pinout

connect to the serial port

The Motionworker must be internally set for RS232 communications. Connect the serial data cable to JR8 on the Motionworker and to an unused serial port on the computer. The MIX program will expect to find the Motionworker on either the COM1 or COM2 serial port of the computer, as specified in the MOTIONWORKER environment variable. In general we recommend installing the trackball (mouse) on COM1 and the Motionworker on COM2. In this case, the AUTOEXEC.BAT would need to have the command SET MOTIONWORKER=2.

set comm parameters

For proper communications with the automation computer, you need to set up the Motionworker Automation Serial Port to 19200 baud. To do this, hit the option select button on the front panel of the Motionworker, use the ∧ and ∨ keys to get to option 39. Hit the option select button again and use the ∧ and ∨ keys to set the speed to 19.

In this mode the communications should be:

RS232
19200 baud
8 data bits
1 stop bit
no parity

Sony 9-pin Interface

The MIX program can control a Sony device that is compatible with the Sony 9-pin interface directly.

make a serial cable

You will need to make a cable to connect the device to the computer. It will be a 3-wire cable, with serial connectors on each end.

The ground pin is connected on both ends. We recommend the use of a shielded cable with the shield connected at one end only. Computers may have a 9-pin male or a 25-pin male serial port connector. The following charts show how to build a serial cable for either type of serial port to connect to the serial port of your Sony device. The cable length should not exceed 4 m (12 feet) unless special low capacitance cable is used. Note that the following charts assumes that the serial I/O board in your computer follows normal PC conventions for DTE and DCE wiring, if not, you'll need to swap pins 2 and 3 in the computer connector.

DB25	Sony Device
7	1,3,4,6,7 Gnd
2	8 Transmit
3	2 Receive

Table 18 - Sony 9-Pin to PC 25-pin Cable Pinout

DE9	Sony Device
5	1,3,4,6,7 Gnd
3	8 Transmit
2	2 Receive

Table 19 - Sony 9-pin to PC 9-pin Cable Pinout

connect to the serial port

Connect the serial data cable to the port labeled TRIBUTARY on the Sony device and to an unused serial port on the computer. The MIX program will expect to find the device on either the COM1 or COM2 serial port of the computer, as specified by the SONY environment variable. In general we recommend installing the trackball (mouse) on COM1 and the Sony device on COM2. In this case, the AUTOEXEC.BAT would need to have the command SET SONY=2.

device set up

The Sony device must have the "NETWORK" enabled.

Timeline Synchronizer

The MIX program will control a Micro Lynx synchronizer directly, and will control other Timeline synchronizers through a System Supervisor Unit (SSU).

make a serial cable

You will need to make a cable to connect the synchronizer to the computer. It will be a 3-wire cable, with serial connectors on each end.

The ground pin is connected on both ends. We recommend the use of a shielded cable with the shield connected at one end only. Computers may have a 9-pin male or a 25-pin male serial port connector. The following charts show how to build a serial cable for either type of serial port to connect to the serial port of your Micro Lynx or SSU. The cable length should not exceed 4 m (12 feet) unless special low capacitance cable is used. Note that the following charts assumes that the serial I/O board in your computer follows normal PC conventions for DTE and DCE wiring, if not, you'll need to swap pins 2 and 3 in the computer connector.

DB25	Micro Lynx or SSU
7	1 Gnd
2	8 Transmit
3	2 Receive

Table 20 - Timeline Micro Lynx or SSU to PC DB25 Pinout

DE9	Micro Lynx or SSU
5	1 Gnd
3	8 Transmit
2	2 Receive

Table 21 - Timeline Micro Lynx or SSU to PC DE9 Pinout

connect to the serial port

The Synchronizer must be internally set for RS232 communications. Connect the serial data cable to the RS232-422 port on the Micro Lynx and to an unused serial port on the computer. The MIX program will expect to find the synchronizer on either the COM1 or COM2 serial port of the computer, as specified by the LYNX environment variable. In general we recommend installing the trackball (mouse) on COM1 and the Timeline synchronizer on COM2. In this case, the AUTOEXEC.BAT would need to have the command SET LYNX=2.

synchronizer set up

No special set up of the Micro Lynx or System Supervisor is required.

Configuring MIX software

The MIX software will configure itself as much as it can, but there are some items you must customize for your specific installation.

In order to start the MIX program, type MIX <ENTER>. If you get the message "Bad command or file name", it probably means that you are not currently in the MIX directory. Check your AUTOEXEC.BAT file in the root directory to determine why you are not in the \MIX directory. Correct your AUTOEXEC.BAT file, reboot and try again to start the MIX program.

When the purple System Configuration screen appears, type the letter 'O' or click the OK box with the mouse. You will be using the Setup menu screens to configure the system. Type 'S' (or click the word 'Setup') to bring up the Setup Menu. Then type the letter for the screen you want, or click the bar with the mouse to access the screen.

MIX Program Hardware Setup

Select the Setup menu from the top of the MIX screen, then select Hardware. Fill in all the fields on this form. You will enter the number of fader modules installed, default time code information (only applies when striping tape from the automation system), and your facility name.

Audioframe Setup

If you are connecting the system to a Waveframe Audioframe system, the following items need to be properly setup:

Audioframe MIDI controllers

You must set up each fader in the system that you wish to use to control a fader (or other mixer function) as a MIDI controller. This is done with the MIDI Controller function on the Setup menu.

Select the function MIDI Controller, then click Insert. On the form that appears, enter the Uptown fader number, the MIDI channel number (which corresponds to the Audioframe mixer channel number), and the controller number. Controller number 7 is MIDI volume, and controls the fader on the Audioframe mixer. Repeat this for all the faders you wish to use as MIDI controllers. Now when the Uptown faders move, the faders (and the digital volume level) on the Audioframe will also be controlled.

Audioframe MIDI switches

To use the Uptown switch banks to control one or more switch banks on the Audioframe, use the MIDI Setup function on the Setup menu. Then enter the MIDI controller number assigned to the switch you wish to control on the Audioframe in the field on the form for the desired switch bank. Now when you change the state of the switch on the Uptown fader module, the switch will also change on the Audioframe.

Exit the Program

Now exit the MIX program. When you next start the program, it will be set up the way you left it.

This completes the basic setup and initial testing of the computer. After the rest of the installation is complete, you will verify that the computer works correctly with all of the attached hardware.

Installing the Automation Hardware

The hardware installation consists of installing the power supplies, installing the fader modules, routing data cables to the computer, routing power cables and performing mute wiring.

Noise Floor Measure-ments

Prior to modifying the console in any manner, it is best to take careful measurements of the console noise floor on the tape and monitor outputs. In this manner, you can prove without a doubt whether or not the installation of the automation system has had any affect on the console noise.

It is important that the measurements be made immediately prior to the installation of the automation system and that no other studio wiring, grounding or equipment changes are made until the automation system is fully installed and the noise floor has been rechecked.

With the automation system fully installed, the noise floor should be carefully checked for comparison purposes. There should not be any audible or measurable degradation of the console noise floor due to installation of the automation system.

Check-out Complete

CAUTION: Before installing, wiring, or applying power to the power supply, carefully read the power supply portion of Chapter 3, Technical Reference Guide. Improper installation of the power supply may cause damage to the power supply and/or the fader modules. Damage caused by such power supply related installation or wiring errors is not covered by any Uptown Automation warranty, express or implied.

supply location

Up to 40 System 2000 fader modules can be powered by one rack-mounted power supply. The power supplies are generally located remotely from the console. Since the power supplies are quite heavy, we suggest that they be installed near the bottom of a rack. Ventilation space of at least 12 mm (1/2 inch) is required above the power supply for proper air circulation.

The power distribution cables supplied with the system are 12 meters (40 feet) long. The power distribution cables (4-pin connector with four wires) should now be run from the vicinity of the fader modules in the console and attached to the power supply. Don't plug the power connectors onto the fader modules yet.

fuses and voltage selection

Check, and double check, the proper value of AC line fuse and proper AC line voltage selector on the power supply setting as described in Chapter 3.

initial power wiring testing

When the wires are installed and connected to the power supply, but before they are connected to the fader modules, turn on the power supply in order to test each and every connector for proper voltage. For each connector:

- verify +5 VDC on pin 2 relative to pin 1 for all connectors.
- verify +24 VDC on pin 4 relative to pin 3 for all connectors.

Installing the Fader Modules in the Console

The audio wiring should be kept away from the data cable and away from the electronics in the fader module by at least 2 or 3 inches if possible to avoid audio noise problems.

Install a bank of eight motorized faders in order to check the fit of the fader modules. Verify the fit of the fader modules in the console and that the fader panel mounting screw fit the console properly.

Each bank of faders will have one power distribution cable and one digital data bus cable connected to it. It is recommended that all such wiring be as short as possible and kept at least two or three inches away from any audio wiring. Run the cables from the power supply to the fader modules, but don't plug in the power connectors yet. Save that step for the post-installation checkout.

All modules in each bank must be interconnected by the bank bus cables. Each bank is connected to adjacent banks by the bank links.

power and data connectors

The connectors provided for the power, data and audio wiring are mass-termination type connectors in which the wire is mechanically forced into place in the housing. The contact formed by such connectors is a reliable, gas-tight joint. These connectors have been selected for their reliability, ease of installation and versatility. If you need to service any of the connectors, the recommended wire installation tool is AMP 59803-1.

The power and data cables and connectors are fully described in Chapter 3.

Do not plug in the power distribution cables yet, they will be tested and connected during final system check-out.

Computer Installation and Wiring

By now the computer should have been set up, with the Uptown I/O and MIDI boards installed and the MIX software installed and configured. If not, go back to the section above and complete the computer setup.

location

The computer must be located within 4.5 meters (15 feet) of the most distant fader module, so that the digital data bus wiring will reach the back of the computer. The computer may be mounted under the console, or in a ventilated enclosure near the console. In selecting the location for your computer, consider that the floppy disk drives should be available for making convenient backups of your mix files.

If you install the computer in a cabinet or other enclosure to reduce the noise level, make certain that the computer has sufficient airflow to prevent overheating.

Route the digital data bus through the console and down near the computer now. Each fader bank must have one 3-pin data bus connector to carry data from the computer to the fader bank. Keep the data cable at least 2 or 3 inches away from all audio wiring. Use double sided tape or plastic standoffs to keep the data cable away from the chassis. Don't allow the data cable to be folded back on itself or tightly coiled because this could cause data errors due to crosstalk.

digital data bus wiring

After a location for the computer is selected and the data cables routed, the Uptown digital data bus wires must be connected to the I/O board ports at the rear of the computer. For proper system operation, **it is very important that the data bus cables for each fader bank be plugged into the proper ports on the I/O board.** The MIX program has several places that it refers to fader modules by number, and if the banks are not plugged in to the proper ports the fader numbering will be incorrect.

The first fader bank (generally the left-most in the console) must be plugged into port A of the first I/O board. The second fader bank must be connected to port B of the first I/O boards. Similarly, fader banks 3 and 4 go to ports C and D of the first I/O board. Then, fader banks 5 and 6 go to ports A and B of the second I/O board and so forth. If this practice is not followed, fader numbers at the console will not correspond to fader numbers in the software and someone will eventually get very confused.

The definition of the proper order of the fader banks is dependent upon how you intend to use the system. In general, it will be best to assure that the numbering of the faders in the automation system agrees with the numbering of the input channels on the console. Any dedicated groupers or stereo masters should follow after the input channels, so that the input channel numbering is not affected. The automation system numbers the faders according to the order that the I/O boards find the faders. Port A of the first I/O board will number the faders 1 through 8. Port B of the first I/O board will number the faders 9 through 16, and so on.

If, for example, there were a bank of faders in the center of the console, surrounded by input channels, such as might be used for group faders and which are not connected to input channels, then this group of faders should be the connected to the last I/O port used in the system. In this manner, all of the input channels will be numbered consecutively and then the group faders will be numbered after the input channels. This way, it is very easy to recognize how the computer channel number relates to the console channel numbering.

time code wiring

For the system to properly record and play back a mix, time code must be available to the MIDI board. This is often obtained from track 24 of the multi-track, or in some cases from the output of a synchronizer. The automation system will simply slave to any time code presented to it. Connect the time code wire to the RCA phono jack on the MIDI board, nearest the 9-pin MIDI port at the rear panel of the computer.

If you are using a synchronizer with the system, we recommend that you connect the time code source (often track 24 of the tape machine) to BOTH the input of the MIDI/SMPTE board (RCA jack nearest to the 9-pin MIDI connector) AND to the master time code input of the synchronizer.

If you desire, you can make the time code generated by the automation system available for striping tape. To do this connect suitable audio wiring to the middle RCA phono jack on the MIDI board.

synchronizer wiring

If a synchronizer is being used with the system, connect the synchronizer serial cable to the rear of the computer, as described earlier.

mouse or trackball wiring

Make certain that the mouse or trackball is correctly plugged into a serial port at the rear of the computer. Note that you may have to select a particular serial port, COM1 or COM2, to match the port selected with the mouse driver software. You may use a mouse extender cable if desired.

keyboard wiring

Plug the keyboard into the keyboard port on the computer. You may use a keyboard extender cable if desired. Such extender cables are available at most computer stores.

monitor wiring

Plug the monitor into the computer monitor port. A monitor extension cable may be used. The monitor should be located at least a foot or more away from any audio wiring in order to avoid audible noise from the monitor power supply.

wiring completed

The wiring for the automation should now be in placed in the console, but the power cables should not yet be plugged into the fader modules. **Do not apply power now.** The system will be checked out first in chapter 5, Post-Installation Testing to prevent wiring errors from damaging the system.

basic wiring done

The basic automation system installation and wiring is now complete.

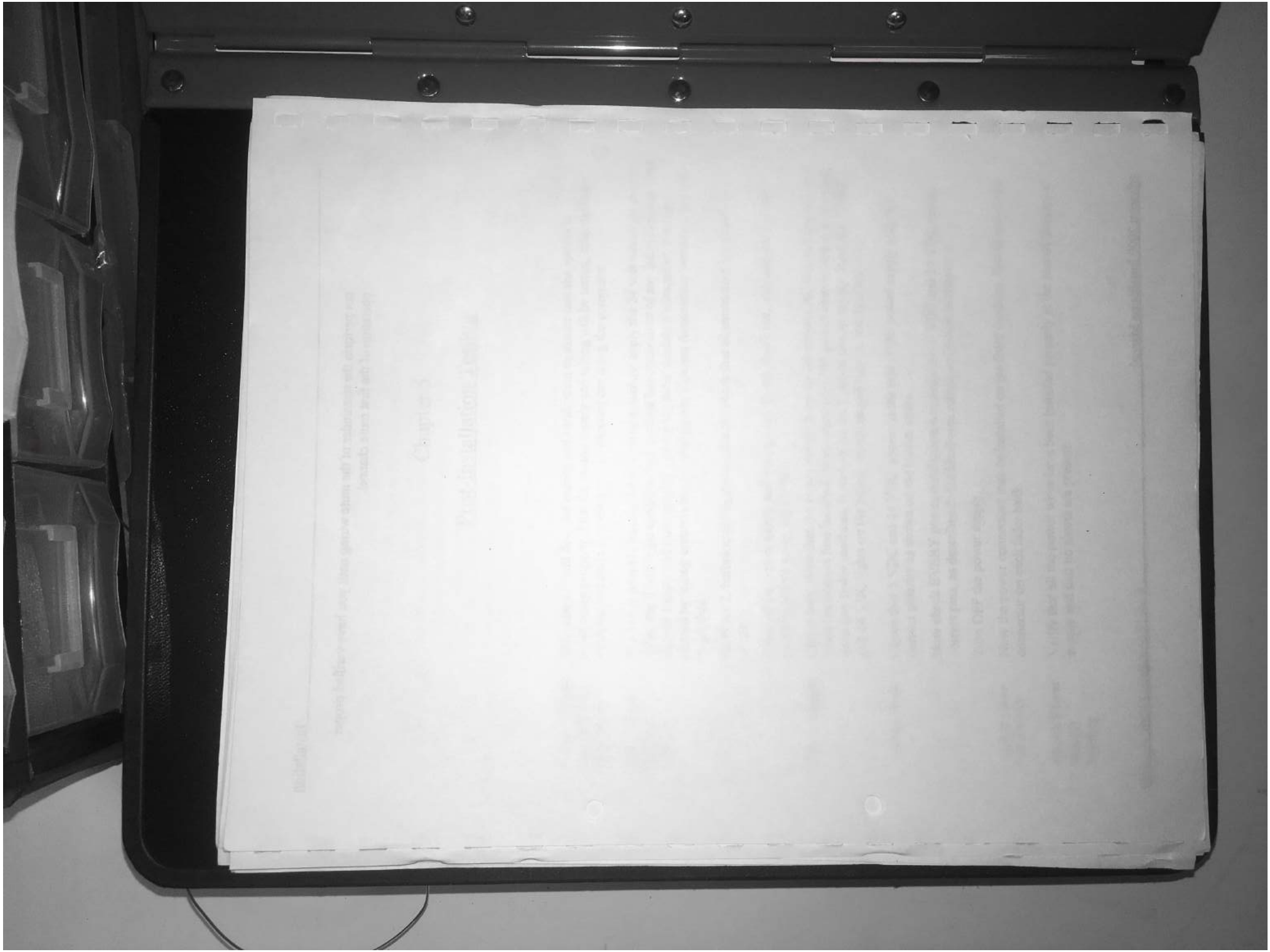
Mute Wiring

Now that the basic automation system components have been located and wired, it is time to finalize the mute control wiring.

In order to verify that the mute control wiring is correct, we recommend that you first wire only one channel and completely test the operation of the mute prior to wiring any additional mutes.

When you have completed the wiring of the first mute control, proceed to the next section of this manual, the Post-Installation Testing, to begin the testing. You should

not perform the remainder of the mute wiring until you have verified proper operation of the first mute channel.



Chapter 5

Post-Installation Testing

Power Supply and Wiring Check-out

This chapter will describe testing and verification to assure that the system is functioning properly. First the power supply and wiring will be tested, then the fader modules and mute operation will be checked out using the computer.

CAUTION Wiring Errors

The worst possible installation error is to somehow apply the 24 volt motor power to either the 5 volt logic connectors or the data bus connectors of any fader modules. The 24 volt supply will quite quickly destroy the fader module if misapplied. Damage caused by wiring errors is not covered by any Uptown Automation warranty, express or implied.

ALWAYS, before applying power, double-check that all connectors are installed properly.

If any of the power supply and wiring tests do not check out, stop and correct the problem before going any further.

Power Supply

Check once more that the power supply is set for the correct AC line voltage, and that it has the correct fuse installed. **Make sure that NO power connectors are plugged onto any fader modules.** Now turn on the Uptown power supply. Both the 5 VDC and 24 VDC lights on the power supply should turn on and stay on.

voltage check

Check that 5 VDC and 24 VDC appear at the rear of the power supply with the correct polarity as shown on the barrier strips.

Now check EVERY power distribution connector has 5 VDC and 24 VDC on the correct pins, as described in the Hardware reference section in chapter 3.

Turn OFF the power supply.

install power connectors

Now the power connectors may be installed on the fader modules. Install one power connector on each fader bank.

Check Power Supply Wiring

Verify that all the power wires have been installed properly at the rear of the power supply and that no shorts are present.

Check Power Distribution Cables

Check that each fader bank has one power-distribution cable connected properly to a 4-pin connector, preferably connected to a module near the center of the bank.

Check Data Bus Connectors

Check that each fader bank has one data bus connector on the 3-pin data connector, preferably connected to a module near the center of the bank.

Apply Power

After doing a final sanity check that all connectors are installed properly, again turn on the automation system power supply and verify that all of the proper voltages exist at the power supply barrier strip.

Computer System Check-out

Now you are ready to re-start the computer and check that everything is working. First, turn on the console power supply. Then turn on the Uptown power supply, turn on the computer and if the MIX program is not automatically started by your AUTOEXEC.BAT file, type CD \MIX<Enter>, MIX<Enter> to start the MIX program.

Many of the following steps assume that you are familiar with the operation of the System 2000. If you have no previous experience with this system, you may need to study the system User's Guide.

Start-up Screen

After the initializing process is completed, a purple box will appear on the screen showing you what hardware the program has found during the initialization. This purple box is called the System Configuration screen. It should show you whether or not a synchronizer has been found, the number of faders, the amount of mix memory available, whether or not the MIDI co-processor board was found, and finally the software version.

If any of the information is not correct, stop NOW and correct the problem. Each item will be discussed in detail next. To bring up the Installation screen at any time, you can run the Initialize Hardware function on the Setup menu, which is most simply done from the keyboard by simply typing S for Setup, then I for Initialize.

The following descriptions will help you to determine if the information is correct and how to troubleshoot any problems.

synchronizer

A synchronizer is not required for operation of the automation, but it makes operation much simpler. If you have a synchronizer, the tape machine controls on the automation screen as well as the middle mouse button can be used to control the synchronizer which in turn controls the tape machine. This is the most convenient setup.

Without a synchronizer, the automation system will follow the time code input and the Uptown tape control buttons will of course have no effect on the tape machine. At any time that time code is not presented to the MIDI/SMPTE card, the tape machine controls can be activated, but they will only cause the automation system to make up its own time code, unrelated to any tape source. Operation without a

synchronizer is therefore quite possible, but this method is certainly not as convenient as having a synchronizer.

If you have a synchronizer installed in the studio, and have connected it to the serial port on the computer, but did not see the appropriate "synchronizer found" message, verify the following:
1) Baud rate and serial communications are set up properly on the synchronizer.
2) Serial cable is wired properly.
3) SYNC_PORT environment variable is not set to 0, and if an Adams-Smith synchronizer is used, is set to the com port the synchronizer is connected to.
4) MOTIONWORKER environment variable is set when using Motionworker.
5) LYNX environment variable is set when using Timeline equipment.
6) SONY environment variable is set when using Sony equipment.

faders

You must see the proper number of faders found.

If this number is incorrect, check the following:
1) Power supply is turned on.
2) Data connectors are installed properly.
3) Module addresses are properly set.
4) Jumpers are properly set on I/O boards in the computer.

You can also run the SYSTEST program in order to check individual fader modules and perform a variety of other system tests. See the SYSTEST manual for information about running the SYSTEST program.

To start the SYSTEST program from the MIX directory prompt, simply type:

SYSTEST<ENTER>

memory records

If you have no expanded memory available for the system, the system will have less than 10000 automation records available. If you have expanded memory available, you will see about 83000 records per each megabyte of expanded memory available. If this does not seem to match what you see on your system, check the following:
1) Memory must be set up as EXPANDED, not EXTENDED memory
2) Expanded memory might be taken by another program.

The program TEMM, supplied with the MIX software, will look for expanded memory, report if it has been found and how much is available for the MIX program. To run it, type TEMM<ENTER> at the DOS prompt. TEMM.EXE is in the MIX directory.

MIDI/SMPTE board

The Uptown MIX software will verify the presence of the MIDI/SMPTE board. The MIDI/SMPTE board MUST be found to operate the automation system. If it cannot be found by the software, check that:

1) The board is installed properly, seated fully in its connector
2) The board's interrupt selection switch has been set to an unused interrupt (IRQ) and
3) The board's address switch setting is not conflicting with any other cards (such as a bus mouse card) in the computer.

Verify Proper Mute Operation

With the computer turned on, the mute ON and OFF buttons on the fader module should operate opto switch 2, the mute opto.

If the mute switches and the console audio mute are working properly, then it is time to go ahead and wire in all of the mute control lines. After completing all of the mute wiring, verify that each of the mutes works properly.

Run a Demo Mix

When everything seems to be working, run a demo mix. This will check that all the data wires are installed in the correct order and faders are being addressed properly. It will also check that the computer is powerful enough to run the system.

Create the Demo File

You must create a demo file using a utility program call WRTDEMO. To run WRTDEMO, make sure you are in the MIX directory and type:

WRTDEMO \mixes\demo xx<ENTER>

where "xx" is the number of faders installed in your system. A file will be created in the MIXES directory called demo.m01 that has a test program for your system.

Run the Demo Mix

If you are using a synchronizer, temporarily disable it by unplugging it from the serial port on the rear of the computer or simply turning off the synchronizer. Make sure the system power supply is on, and start the MIX software again. After the initialization process, when the normal automation screen appears, go to the Automation menu and select Retrieve Stored Mix. Select the latest version of mix file DEMO. This is the demo mix file that you have just created using the WRTDEMO utility.

To start the demo running, select the Play button (click it with the mouse or type <ALT>+P). The faders should start to go through the demo. Note that you must disable the synchronizer (or have a tape available with time code on it starting at 01:00:00:00) for the demo to run.

Things to Look For

Look for the following things while the demo is running:

fader order The first thing to observe is that the faders move in the correct order, from channel 1 to the last fader installed. If they do not, then the data cables are plugged into the wrong fader banks or the wrong ports on the back of the computer.

fader smoothness When the Wave is running all the faders, they should move smoothly. If they look choppy, look at the computer screen while they are moving roughly and look for a letter "L" next to the mix name. If an "L" flashes, the computer is not powerful enough for the number of faders installed. A common problem is that the turbo button is not activated on the computer.

fader speed When the faders do the Rocket faders demo, they should look uniformly fast. If any look very different, it could indicate excessive friction in the fader or a problem in the fader module.

touch sensors Click the Ready button on the Automation window with the mouse (or type <CTRL>+R) Now go down the console, one by one, and touch each of the fader knobs. The null lights on the fader module should turn red and the fader should not fight you.

mutes While the MIX program is in the Ready or Write modes, mute switch activity will be memorized and played back. Try pressing a few of the automated switches while the demo program is running (with the Switches box highlighted on the computer screen, and the system in Ready mode). Then, stop the mix, rewind, and play back the new mix to see that the mutes play back properly.

control panel If you have a control panel installed, the programmable soft switches can be setup now if desired, using the Setup, Control Panels pull down menus. (For full details on using the menus and setting the soft switch functions, see the User Guide.)

Time Code Test Stop the demo mix. Load a tape that has known good time code, or stripe a tape using the MIX software function Stripe Tape on the Tape menu. Play the tape and observe that the correct time code is displayed on the computer screen.

Synchronizer Test Turn on the synchronizer and make sure it is connected to the tape machine(s) it controls. Plug the synchronizer back into its serial port at the rear of the computer and run the Initialize Hardware function on the Setup menu. The start-up screen should show an appropriate "synchronizer found" message. You should be able to operate the tape machines from the automation system now. Note that you probably have to enable the tape machines you want to control with the Tape1, Tape2, and Tape3 buttons on the Tape Machine Control window on the computer screen. You should also see time code moving while you rewind the tape, if your synchronizer and tape machine support this function.

Noise Floor Comparison

If you took noise floor measurements, as recommended in the installation section, it is now time to make comparison measurements. Properly installed, there is no reason for any increase in the console noise floor due to the addition of the Uptown System 2000.

If the console noise floor has been degraded, see Appendix B for audio noise troubleshooting techniques.

Check-out Complete

When you have been through these initial tests, please call our Technical Support hotline at (800) 343-3237 and we will go through an on-phone system checkout, which may include some additional testing, to assure that your system is operating properly.

If you want to start mixing right away, read the User's Manual section "Quick-Start" for complete information about doing mixes.

Chapter 6

Troubleshooting

Symptoms and Solutions

This section describes some of the symptoms that may be observed and how to fix the problems they represent.

1.) Faders enter manual mode

One or more faders go into manual mode (stop moving) unexpectedly. If the fader has entered manual mode, you should be able to start it moving again by resetting the system to AUTO or READY mode.

If a fader cannot move to the desired position accurately for any reason, the fader module will allow 10 seconds for the problem to clear itself and then it will turn the fader off by putting that channel in the manual mode.

The problem may be due to a fader which is not moving freely, such as due to excessive friction in the fader shaft bearings. If the fader movement seems unusually heavy, see Chapter 3 for fader cleaning and lubrication details.

It is also possible that the fader string tension is incorrect. See Chapter 3 for information about testing and setting fader string tension.

Another possible cause for this condition could be if the screws that hold the fader to the panel are too long, or have been forced down too far. If the mounting screw penetrates the fader too far, it could prevent the fader from going all the way to the bottom or top of its travel.

Inaccurate positioning could also be caused by an obstruction on the console, a knob or shaft rubbing on the fader panel, or a defective fader.

2.) Power supply lights are not on

Power supply is turned on, but 5 VDC or 24 VDC LED is not illuminated:

The LEDs directly monitor the outputs of the DC power supplies. If one of the two LEDs is not illuminated, the proper operation of one LED shows that the power line voltage and fuse are ok. If neither LED is on, the AC power cord, connector and fuse should be checked.

A particular power supply output voltage may be abnormal if the output wiring is shorted, the protection fuses are blown, the power supply has failed or if the sense leads are shorted.

3.) Can't get a mix to start

You can't get a mix to start, even though time code appears to be running.

This indicates that time code is not being read by the MIDI board. To verify this, watch the area just above the time code display. If the "Tach" does not go away when the tape machine is started, the MIDI board is not reading time code. This is true **even if time code appears to roll**. This can occur if a synchronizer is attached and it is reading time code in tach mode, and supplying the system with this guess of the actual time code.

To diagnose this problem, you must prove to yourself that real time code is reaching the MIDI/SMPTE board input. Try to patch the wire that plugs into the MIDI board into the console and listen to the time code. If this appears OK, try another tape with known good time code. If the second tape works, re-stripe the first tape.

4.) Synchronizer is connected, but not found

There are several things to check here if a synchronizer should be working, but you are having problems with it:

- Check that the internal parameters are set correctly in the synchronizer. See the Synchronizer setup information in Chapter 4, or look under "Synchronizer" in the index.
- Verify the integrity of the serial cable between the synchronizer and the automation system computer.
- Try the "other" cable polarity. Reverse the connections to pins 2 and 3 on the computer connector, or install a null modem in series with the cable.
- Make sure the environment variables are set correctly. In particular, verify that SYNC_PORT is not set to zero. See the "environment variables" section.
- Check the internal synchronizer internal data protocol jumper. The Zeta III has a jumper to connect either the RS422 or RS232 to the computer port. It is factory-set to the RS232 port, but you could check it to make sure. You must remove the top cover on the synchronizer to inspect this jumper.
- Test the PC's serial port, using a program such as Checkit with a loopback plug.

5.) "Disk Drive Door Open" Message When Starting the Program

If you get the message "Disk Drive Door may be Open" when you try to start the system, this could be caused by the MIX program trying to read the A: or B: floppy disk drive. This could occur if the last time you left the program you had selected one of the floppy disk drives, for example if you were loading mixes from a floppy disk. The program remembers the last disk drive and directory you have selected and tries to move to it the next time you start the MIX program.

To get around this problem, just insert a formatted floppy disk in the computer, with or without any data on it, and click OK on the message box. Then change to the hard disk by using the File menu function to Move to a New Directory.

6.) Fader touch sensor problems

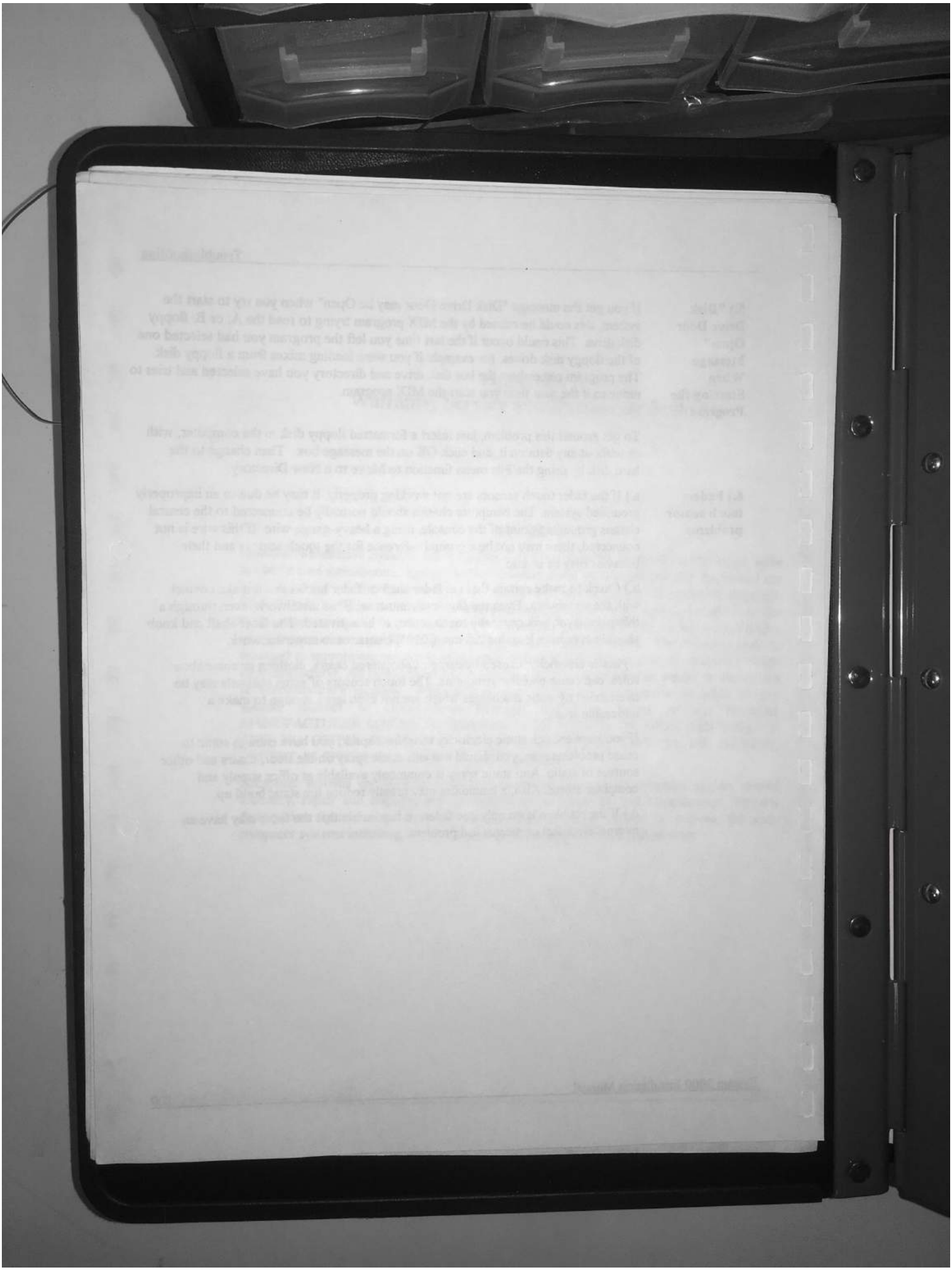
a.) If the fader touch sensors are not working properly, it may be due to an improperly grounded system. The computer chassis should normally be connected to the central chassis grounding point of the console, using a heavy-gauge wire. If this wire is not connected, there may not be a ground reference for the touch sensors and their behavior may be erratic.

b.) Check to make certain that the fader shaft or fader knob cannot make contact with the metalwork. Even the slightest contact with the metalwork, even through a thin paint layer, will cause the touch sensor to be activated. The fader shaft and knob should never have less that .25 mm (.010") clearance to any metalwork.

c.) Static electricity, caused by carpet, upholstered chairs, clothing or some shoe soles, can cause peculiar symptoms. The touch sensors of some channels may be overloaded by static discharges which are not even large enough to make a noticeable spark.

If you have enough static electricity to make a spark, you have enough static to cause problems... so, you should use anti-static spray on the floor, chairs and other sources of static. Anti static spray is commonly available at office supply and computer stores. Also, a humidifier may greatly reduce the static build up.

d.) If the problem is on only one fader, it is possible that the fader may have an internal electrical or mechanical problem.



Appendix A
Warranty, Service and Disclaimer Policies

WARRANTY

Uptown Automation Systems Inc. (Manufacturer) warrants the Products, so far as the same are of its own manufacture, against defects in material and workmanship under the normal use and service for which they were designed, for a period of one (1) year after date of shipment. Manufacturer's obligation under this warranty being limited, at its option, however, to the replacement or repair of a part or parts determined by it to be defective. All necessary packing and transportation costs for return of the goods to be paid by sender. The Products must be returned in appropriate anti-static packaging, comparable to that used in the original package by Manufacturer. All replacement or required goods will be returned to sender by like means at Manufacturer's expense. Manufacturer shall under no circumstances be liable for any special, indirect or consequential damages owing to failure of the Products. MANUFACTURER MAKES NO WARRANTY OF FITNESS OR MERCHANTABILITY AND NO OTHER WARRANTY, ORAL OR WRITTEN, EXPRESS OR IMPLIED, EXCEPT AS SPECIFICALLY SET FORTH HEREIN.

Computer systems are warrantied by their manufacturer and all computer system related warranty, repair and shipping are the limited to the terms of said manufacturer. Uptown Automation Systems Inc. does not provide any warranty, implied or express, for such computer systems including, but not limited to computer, keyboard and monitor.

TECHNICAL SUPPORT

If you have any problems during installation or normal use of your Uptown automation system, please call our Technical Support hotline toll-free at (800) 343-3237. The toll-free line is for Technical Support only, for other inquiries, please call us at (303) 581-0400. Our fax line is (303) 581-0114.

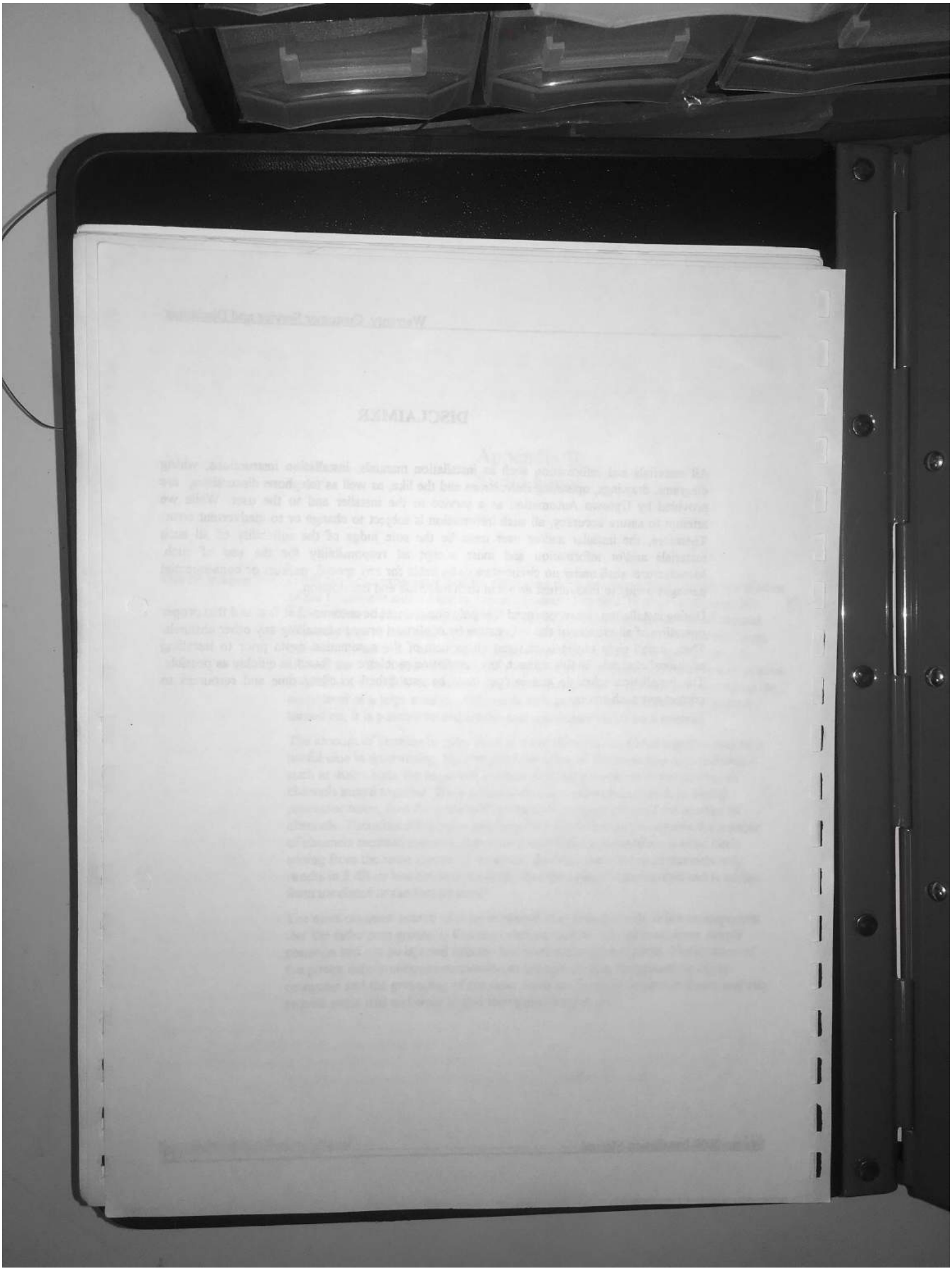
Prior to return of any Products, contact Uptown for a Returned Material Authorization (RMA). In order to expedite, the RMA number must appear on the package label.

The Products must be returned in appropriate anti-static packaging, comparable to that used in the original packaging by Manufacturer. Any electronic components or assemblies returned without proper anti-static packaging will be out of warranty and will be subject to all applicable out-of-warranty repair charges. No returns for credit will be accepted if Products are modified, damaged or returned without proper anti-static packaging.

DISCLAIMER

All materials and information such as installation manuals, installation instructions, wiring diagrams, drawings, operating instructions and the like, as well as telephone discussions, are provided by Uptown Automation as a service to the installer and to the user. While we attempt to assure accuracy, all such information is subject to change or to inadvertent error. Therefore, the installer and/or user must be the sole judge of the suitability of all such materials and/or information and must accept all responsibility for the use of such. Manufacturer shall under no circumstances be liable for any special, indirect or consequential damages owing to inadvertent errors in such materials and information.

During installation, we recommend that only one channel be automated at first and that proper operation of all aspects of the automation be confirmed prior to installing any other channels. Then, install eight channels and test all aspects of the automation again prior to installing additional channels. In this manner, any installation problems are found as quickly as possible. The installation schedule and budget must be established to allow time and resources to correct any such errors.



Appendix B
Audio Noise

Performance

It has been our experience that the equivalent noise per channel with proper installation of the Uptown™ automation system is less than -100 dBu. In most cases, such low noise will not be heard and is difficult to directly measure on any individual channel. The only way to find such a low level noise is to sum together the outputs of a large number of channels. For example, considering uncorrelated noise sources on a 40 channel console, a noise level of -100 dBu for each channel would result in a total noise level of -84 dBu if all 40 channels are summed together. In this manner, measuring the noise level of a large number of channels with and without the automation system turned on, it is possible to deduce the average noise level of each channel.

The amount of increase in noise level as more channels are added together may be a useful clue in determining the source of the noise. If the noise source is correlated, such as mains hum, the noise will increase in direct proportion to the number of channels mixed together. If the noise sources are uncorrelated, such as digital processor noise, then the noise will increase as the square root of the number of channels. Therefore if the noise increases by 6 dB each time you double the number of channels summed together, the noise is correlated and therefore is most likely arising from the same source. If, however, doubling the number of channels only results in 3 dB or less rise in noise level, then the noise is uncorrelated and is arising from unrelated or random sources.

The most common source of noise is related to system grounds. It is very important that the fader case ground is tied to chassis or back to the Uptown power supply common and not be injected into the low level audio ground paths. The location of the power supply common connection to console chassis, the grounding of the computer and the grounding of the fader cases are the most important issues and may require some trial and error to find the optimum solution.

Sources of Noise

There are a number of possible sources of noise. The first task is to try to determine the actual source of the noise. Then, armed with an understanding of the cause, various types of solutions will be appropriate. In order to find the source of audio noise, considerable sleuthing may be required.

Keep in mind that the noise might be arising from several sources, so that several small, incremental solutions could be required to achieve the desired result. For example, one type of noise might be masking other noise such that after you correct one condition, you may want to start over and find the cause of some other noise source which was previously not audible.

In general terms, the process of making changes to the console while adding the automation system could possibly cause audio hum due to improper grounding, audio hum or digital noise due to ground loops, digital noise from the automation system data bus, digital noise from the automation fader modules, digital noise from the AT computer, noise from a defective fader motor or radiated noise from the computer monitor.

Although noise may be difficult to describe in words, particularly if the noise is arising from more than one source, the following are a few fundamental categories of noise which may be recognizable.

Mains Hum

The best way to verify that the hum is really arising from some sort of stray coupling to the power line is to view the audio on an oscilloscope and set the scope to trigger from the line. If the hum stays exactly stationary on the scope, then it is indeed mains hum, but if the trace does not exactly sync to the power line, the noise is from some other source (such as the computer monitor).

Mains hum is most likely due to a shielding or grounding problem related to the fader audio wiring. Is the hum on all channels or only on a few? Do the faders seem to operate properly? Check the audio wiring carefully. Shielding of the audio wiring might be required. The fader case ground may or may not need to be connected to console chassis ground. (The fader case ground should never be connected to audio ground.) In most cases, any fader wiring shield should only be connected to ground at one end, in order to avoid ground loops.

Digital Noise

Digital noise might arise from a number of sources. So, the first step is to figure out what is causing the noise, then an appropriate solution should be quite straightforward. The noise from the computer monitor and the noise from the digital data bus are the most easily recognizable, and the easiest to fix.

Computer Monitor: Noise from the computer monitor is generally made up of two types of noises. The most troublesome is the magnetic field spike generated by the high voltage flyback transformer. With some monitors, this magnetic spike will cause a nasty buzz in audio wiring for a distance of up to several feet. The buzz will typically be at a frequency of 50 to 90 Hz, depending upon the type of display card in your computer.

The monitor will also radiate a high frequency noise, typically 15 to 50 KHz, which will not generally be audible, but might end up causing audio intermodulation problems. The low frequency is the vertical scan rate of the monitor, while the high frequency is the horizontal scan rate.

Digital Data Bus: The digital data bus from the computer to the fader modules is a possible source of noise. The data cable, all the way from the computer to each bank of the fader modules, must be kept several inches away from any audio wiring. The entire data cable, from the computer to each bank of faders, should be carefully inspected and rerouted if necessary. Ordinarily, the noise from the data cable sounds like a tick occurring at the system frame rate.

For test purposes, to determine if the data cable is the culprit, you may find it useful to deliberately create some data bus noise by placing a portion of the data cable against an audio cable on a fader while the system is running an automated mix. If the resultant noise is the same sort of sound as the original noise, then you'll know that the data bus is indeed the cause.

Fader Module Circuit Noise: The audio wires from the faders to the motherboard should be short and direct, and should be as far as possible from the data cable, the bank bus wiring and should be kept as far as possible from the fader module circuit board which is located under each fader.

Any digital noise from the fader module would generally be sort of a high pitched whine with irregular variations.

Fader Case Ground: The motor and the control wiring inside the fader may radiate some energy which is received by the metal case of the fader. Such stray currents must not be allowed to be injected into the audio ground system of the console. The noise currents need to be returned to the Uptown power supply, generally though the chassis ground. So, it is important that the fader case ground terminal be routed to a low impedance path to chassis and then from chassis back to the Uptown power supply.

General Test Plan

If the source of the noise has not yet become apparent, it may be necessary to start on a methodical plan which will help to isolate the source of the noise. The following tests are designed to assist you in isolating the cause of any sort of noise.

a.) First of all, you should positively verify whether the noise is being caused by any of the automation system, including the computer and the monitor. For this test, try turning off the Uptown power supplies, turning off the computer and turning off the computer monitor. That will turn off all of our digital logic, end all data communications and will stop any radiation from the computer and from the computer monitor.

If there is any noise left at this point, the automation system and/or computer system cannot be the cause. Therefore, noise sources such as missing grounds or ground loops in the console must be suspected as the cause.

b.) Next, try turning on the Uptown power supplies while leaving the computer and monitor turned off. This will allow the fader modules to begin normal operation. If there is any noise increase when turning on only the power supplies, then the digital logic in the fader modules is probably the source of the noise.

The most likely causes of such noise would be stray capacitance to the audio wiring or a ground loop problem allowing digital logic currents to flow through the audio ground system. Make certain that all audio wiring is kept as far as possible from the fader module circuit board and data bus wiring.

The fader audio wiring is a possible source of noise pickup and is also a potential source of a ground loop. While some versions of the audio cable have used shielded audio wiring, we have generally changed to ribbon cable to help to improve the fader cutoff (which is greatly affected by fader input to wiper capacitance). As long as the audio ribbon cable is kept well away from the fader module circuitry, the ribbon cable should work fine. The audio connector on the fader has four connections: fader top, wiper, bottom and case ground. While some installations have connected the fader case to the chassis ground, this ground is a possible source of a ground loop and should be removed for a comparison test. For removal, simply remove the chassis ground wire from the audio connector.

This test will require a bit more effort than the tests above, since the ground wire (i.e. the wire which is connected to the case of the fader) will have to be removed from or added to each and every fader. This effort is suggested because there is some possibility that the fader case ground connection may be causing a very low level ground loop due to the touch sensor power connections which utilize both the 5 volt logic supply ground and the case of the fader (which serves as a reference for the touch sensor operation).

It is possible that the fader wiring may require shielding and it may be very important whether the shield is connected at both ends or only at one end, and it may also be important which end (fader end or console end) the shield is connected.

c.) Next, with the Uptown power supplies turned on, try turning on the automation system computer and the monitor. Note whether turning on the monitor causes any noise. If the monitor is the source of the noise, it will probably be necessary to either relocate the monitor or buy a shielded monitor. The noise from the monitor is quite difficult to shield against. Simple measures such as copper braid or aluminum foil shielding will probably not work. Special alloys such as mu-metal are generally required to eliminate such magnetic field interference.

Noise from the computer, when the MIX program is not loaded (the DOS cursor sitting at the DOS prompt), could arise due to system ground loops or radiation directly from the computer (most likely the power supply in the computer). Try connecting a very large ground wire from the computer chassis to the console chassis ground. The mains ground in the computer power cord may have to be eliminated when other grounds are provided in order to avoid creating even worse ground

loops. Also, try connecting the computer case to the Uptown power supply common terminal.

With the computer running the MIX software, and a mix actually running (with the on-screen status box showing RUN mode) the normal data communications will exist on the data bus. If data noise is detected in this condition, then the routing of the digital data bus is allowing some coupling of digital data into the audio wiring.

Any such coupling will most likely be due to stray capacitance between the data bus and the audio wiring. The audio wiring should be kept as far as possible from the data bus cables and the bank bus cables. Generally, with customary console impedances of 10K or less, an inch or two of separation between the audio wiring and the data cable is sufficient. The higher the impedance of the audio line, the more noise will be capacitively coupled. The audio wiring may require shielding if the audio wiring must be with an inch or two of the data bus wiring or if the impedance is very high.

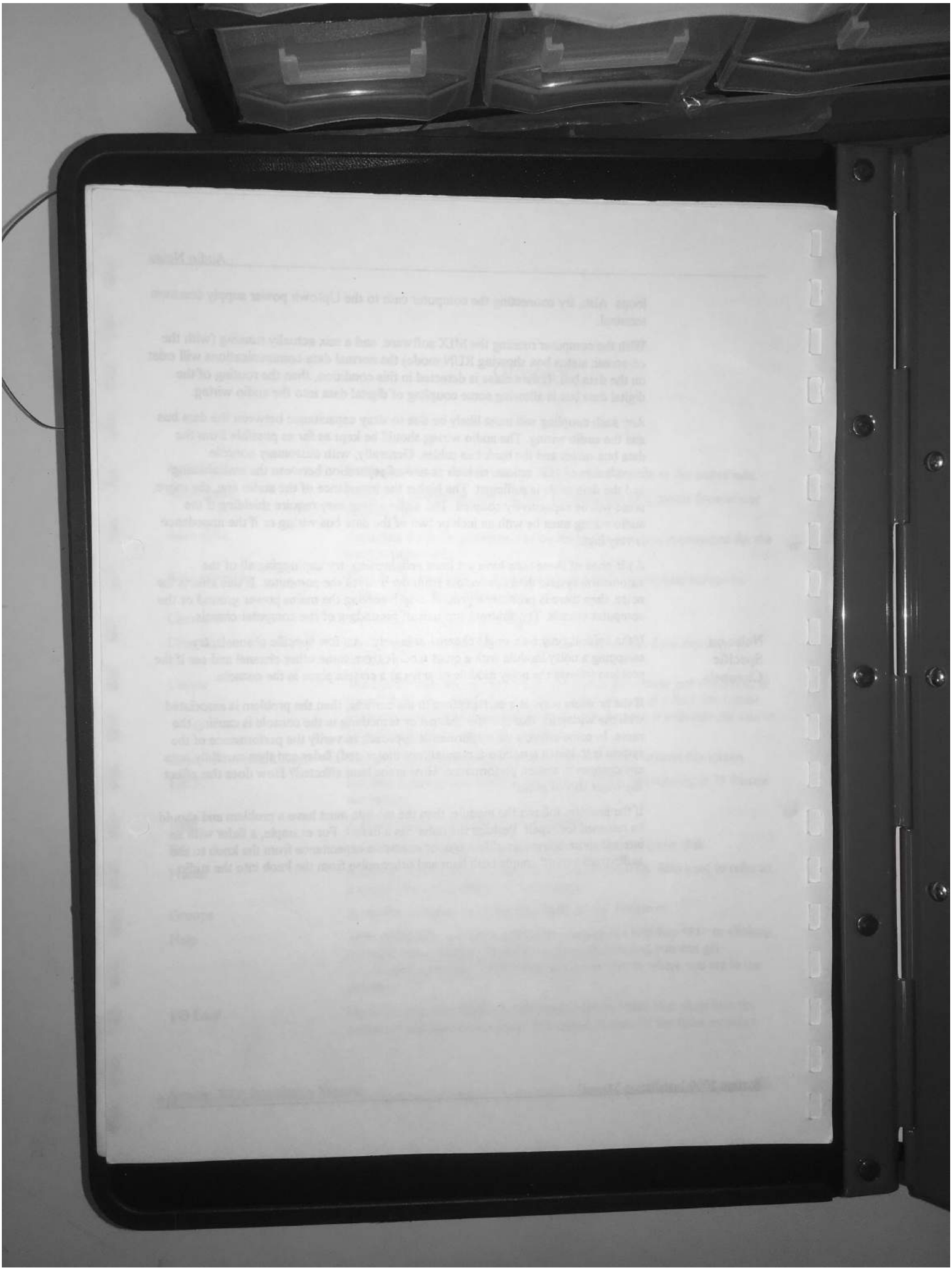
d.) If none of these tests have yet been enlightening, try unplugging all of the automation system data connectors from the back of the computer. If this affects the noise, then there is probably a ground loop involving the mains power ground or the computer chassis. Try different schemes of grounding of the computer chassis.

Noise on Specific Channels

If the noise is only on a single channel or is only on a few specific channels, try swapping a noisy module with a quiet module from some other channel and see if the problem follows the noisy module or stays at a certain place in the console.

If the problem stays at a certain place in the console, then the problem is associated with the wiring for that specific channel or something in the console is causing the noise. In some cases, a very informative approach to verify the performance of the system is to install a standard, manual (not motorized) fader and then carefully note any changes in system performance. How is the hum affected? How does this affect any other sort of noise?

If the problem follows the module, then the module must have a problem and should be returned for repair. Perhaps the fader has a defect. For example, a fader with an internal short, some sort of leakage, or excessive capacitance from the knob to the audio tracks could couple both hum and other noise from the knob into the audio.



Glossary

Auto Mode	Fader plays back stored data, no changes can be made to the stored mix.
Auto-chase	Following the master tape machine automatically as it moves forwards or backwards.
Auto-sync	Adjusting the fader positions and mutes to the positions appropriate for the current time code.
Auto-override	Feature allowing easy updating of stored switch (mute) instructions by holding down the mute buttons.
Character	Any letter or single number digit.
Cross-fade	Changing the level of one or more channels smoothly from one level to another.
Cursor	The highlighted box on the screen. The cursor may cover just one letter, or it may highlight a whole menu option. When you are in a field, the cursor indicates where what you type next goes. On a menu, it indicates the choice you will activate by pressing <ENTER>.
Cursor Movement Keys	The keys (such as arrow keys) that move the cursor around the screen.
EBU	European time code standard, similar to SMPTE, but running at 25 frames per second.
Field	A place to enter information on the screen.
File	A collection of related information stored on the computer disk.
Frame	Refers to video frame, 1/30th of a second (in the US). Also used to refer to a single time code number on audio tape.
Groups	A number of faders or mutes that move or act in unison.
Help	The on-line help system, available by pressing the help key <F1> or clicking the right mouse button. While the program is running, you can get information on topics. The information is relevant to where you are in the program.
I/O Card	Input/Output card. Refers to the printed circuit board that plugs into the computer and handles the input and output of data for the fader modules.

Manual Mode	The fader acts like a non-automation fader, and the automation mute is released but still available in manual.
Menu	A list of options to select from.
MIDI	Musical Instrument Digital Interface, a standard originally created for synthesizers to use to communicate, now used by many types of musical and recording equipment.
Mouse	A pointing device with several buttons.
Mouse Pointer	Small arrow that moves when the mouse moves, used to select items on the screen.
Mute	To electronically silence a channel.
Null LEDs	The two LEDs that show relation between current and stored fader position.
Opto	Stands for optically-coupled isolator, commonly called opto-isolator or simply opto. They are used somewhat like relays to connect the Uptown fader module to the mute circuitry and to control other external circuitry.
UPTOWN Session	The time between starting the UPTOWN program and exiting it.
RAM	Random Access Memory. On a computer, internal system memory. This is not disk space.
Ready Mode	Normal automation mode. Faders play last recorded moves, and touching a fader records the new position.
Screen	The computer monitor (typically a cathode ray tube, CRT).
SMPTE	The type of time code used in the US that the system uses to keep track of when automation moves are made. A unique number is stored every frame. The format of SMPTE time code is HH:MM:SS:FF, (hours:minutes:seconds:frames).
Snapshot	A "picture" of all fader levels at a given time. May be used to cross-fade to.
Splice	In this context, connecting two or more previously made automation mixes to get a new, combined, mix.
Synchronizer	The electronic equipment that reads time code from the tape machines connected to it. Also, it will synchronize two or more machines.
Time code	A system of storing a unique time number on video or audio tape to keep track of synchronization.
Write Mode	The automation mode where the fader's position is constantly being recorded, whether or not it is being touched.

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