



Installation and Operation Manual



ADMS 44.22 ***AES Digital Matrix Switcher***

Firmware Version 1.2 or above

Manual Update: 09/20/2007

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INTRODUCTION

Thank you for your purchase of a Broadcast Tools® **ADMS 44.22 Analog / AES Digital Matrix Switcher** (referred to as the ADMS 44.22 throughout this manual). We're confident that this product will give you many years of dependable service. This manual is intended to give you all the information needed to install and operate the Broadcast Tools® ADMS 44.22.

SAFETY INFORMATION

Only qualified personnel should install Broadcast Tools® products. Incorrect or inappropriate use and/or installation could result in a hazardous condition.

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WHO TO CONTACT FOR HELP

If you have any questions regarding your product or you need assistance, please contact your distributor from whom you purchased this equipment.

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CAUTION!

Broadcast Tools® Products, as with any electronic device, can fail without warning. Do not use this product in applications where a life threatening condition could result due to failure.



NOTE:

Read this manual thoroughly before installing and operating the ADMS 44.22.

This manual should be read thoroughly before installation and operation.

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INTRODUCTION

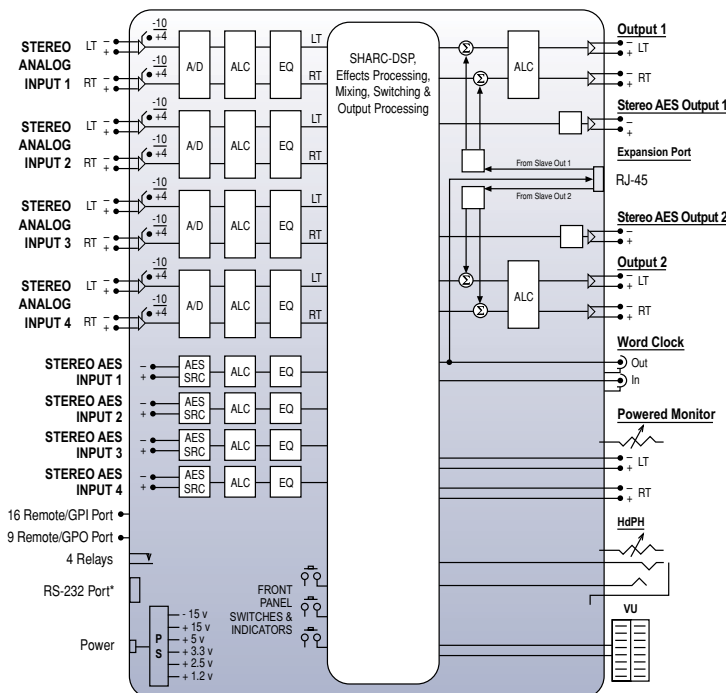
Functional Description

1.1 Introduction

The ADMS 44.22 is an 8x2 stereo matrix switcher with four stereo analog and four stereo AES inputs, and two independent stereo analog and AES outputs in a 1-RU profile. Each input channel is equipped with an automatic level control circuit and a fully configurable 3-band equalizer. The ADMS 44.22 provides both word clock in and word clock out signals for synchronization to external digital equipment. Additionally, the four stereo AES inputs support high-quality real-time sample rate conversion for connection with asynchronous digital sources. Each output channel is equipped with an automatic level control circuit and parallel stereo analog and stereo AES outputs. Either output can be monitored locally from headphones or the monitor outputs, or the stereo PPM meter.

Any or all of the inputs may be mixed, faded, dimmed to either or both output channels. Fade rates, dim levels, and mix modality are all fully programmable. The ADMS 44.22 is equipped with a digital expansion port that allows two units to operate together as a 16x2 stereo matrix switcher. The ADMS 44.22 can be controlled through RS-232 serial command from a standard ANSI terminal or dedicated serial control device, as well as from front panel switches and remote control inputs on the rear. The ADMS 44.22 has four programmable relays and nine programmable open collector outputs for controlling external device, and can transmit unit status and GPI information to the controlling device for incorporation into broadcast automation systems. All unit settings can be saved into user memory, or be automatically saved whenever a setting is changed.

A signal flow diagram of the ADMS 44.22 (configured as a Master) is shown below:



* Optional Broadcast Tools® USB-RS232 Smart Adapter Cable or ESS-1 Ethernet to Serial adapter.

DESCRIPTION

1.2 DSP Processing

1.2.1 Matrix Switcher

The ADMS 44.22 8x2 stereo matrix switcher can connect and disconnect (mute) any input in any combination to one or both outputs. All basic switcher functions can be performed using either the front panel buttons or remote switch or open collector closures. The ADMS 44.22 front panel has one pushbutton for each stereo input channel, and four modifier buttons. Switcher operations are executed by pressing either one or several buttons in combination. A more comprehensive set of switcher controls is available using RS-232 control.

As a general rule, switcher operations affecting connections to one output do not affect connections to the other; they operate independently. However, several commands do affect both outputs. These commands are noted in the RS-232 Command Set section of the manual.

- **Switcher Modes**

The ADMS 44.22 operates in three different Switcher Modes that determine how front panel and terminal commands affect the switching matrix:

Mix Mode

In Mix Mode, any or all inputs can be connected to one or both outputs. Connecting and disconnecting an input has no effect on any other connection.

Interlock Mode

In Interlock Mode, only one input can be connected to an output at a time. Connecting an input to an output disconnects all others from that output.

Overlap Mode

In Overlap Mode, two inputs can be connected to an output at a time while the button for the second input is held. When the button is released, the first channel is disconnected.

Front panel and remote control operations always obey these three Switcher Mode rules. However, certain terminal switcher commands behave differently depending on the Switcher Mode. Modal switcher commands emulate the behavior of the front panel buttons by following the three Switcher Mode rules. Non-modal switcher commands always follow the rules for Mix Mode, and ignore the rules for Interlock and Overlap Modes. Details about how each switcher command functions in each of the modes can be found in the section 4 of the manual.

- **Connect/Disconnect (Mute)**

To avoid the abrupt discontinuities associated with hard analog switching, the ADMS 44.22 employs a 'soft switching' DSP process.

When an input is connected or disconnected (muted), the DSP does a quick 0.5-second fade up/fade down on the input, simulating a fast analog fader move. While there both modal and non-modal switcher connect commands, disconnect commands are always non-modal and do not effect connections on any other inputs.

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- **Fade Up/Fade Down**

The ADMS 44.22 can fade one or more channels up or down at a preprogrammed Fade Rate ranging from 0.5 to 10.0 seconds. The Fade Rate is global for all channels. In Interlock and Overlap Modes, fading one channel up initiates an automatic equal-power cross fade by fading down any connected input(s) at the same rate.

- **Dim**

Any connected input may be dimmed (gain reduced) by any amount from -0.1 to -20.0 dB without affecting any other input connection. Sending a connect, fade, or disconnect command to a dimmed channel cancels the dim state. Dim Levels can set on a channel-by-channel basis, and affect the input's Dim Level in both outputs. When a fade is applied to a dimmed channel, the fade times are adjusted to match the time taken to fade between the same gain levels on non-dimmed channels.

1.2.2 Automatic Level Control

Each input and output channel contains an automatic level control circuit (ALC) that is designed to normalize the program signal peaks to a target output level without dramatically altering the dynamic range of the material. If the average level of the program signal is below the target output level, the gain is slowly raised until the program peaks in the vicinity of the target output level. If the average level is above the target output level, the gain is quickly reduced. A built-in limiter prevents program peaks from causing clipping. The ALC can be enabled/disabled on a channel-by-channel basis.

The ADMS 44.22 ALC combines features from several commonly used DSP processes: compression, limiting, and automatic gain control. However, the ALC controls described below are unique to the ADMS 44.22, and therefore must be understood in order to set up the ALC for effective operation.

- **Target Output Level**

The target output level sets the upper ALC output's upper dynamic range detector. The factory default for this setting is +4 dBm/-20 dBFS (0 VU). Set the target output level to match or slightly exceed the nominal program level for your facility. Because the ALC employs a fast-averaging detector, when on-air program levels are set using VU meters, under some circumstances it may be appropriate to set the target output level 3 to 6 dB above the facility's nominal VU level. Ideal operation occurs when the average level of the program source does not substantially differ from the target output level.

- **Threshold**

To prevent the gain from increasing during silence gaps in the program, once the program level drops below a programmable threshold setting the ALC gain is 'held' until the level exceeds the threshold once again. This allows the ALC to adjust its nominal gain to the average level of the program material without the silence gaps affecting the average gain calculations. The net

effect is that when program level returns, there are no sudden gain changes made, as would be the case with a standard compressor/limiter. For effective ALC operation set the threshold at the very bottom of the dynamic range of the program level. Setting the threshold too low may cause an increase in the noise floor of the channel during silence gaps.

- **Ratio**

The ALC ratio control applies standard compression to the program signal if the program level exceeds the target output level. When the program level is below the target output level but above the threshold, the ratio determines how quickly the ALC adjusts the program to the target output level. Lower ratios mean slower rates, and higher ratios faster rates. The ALC is most transparent when operating with low ratios, and is effective even when no compression is applied (ratio = 1.0). A ratio of 1.2 to 1.5 is recommended in most applications. Care should be taken with higher ratios, as compressor 'pumping' may be heard with certain program material.

Automatic limiting is employed to prevent when the instantaneous program level + the ALC gain would otherwise cause ALC output clipping. The limiter is in effect even with a ratio setting of 1.0.

1.2.3 Equalizer

Each input channel is equipped with a fully programmable 3-band equalizer. Each band can be independently set to be a peaking, high shelf, or low shelf filter, and can be individually enabled/disabled. Each band's center (peaking) or corner (shelving) frequency can be set from 20 Hz to 20 kHz for all supported sample rates except 32 kHz. At a 32 kHz sample rate, equalizer frequencies are limited to 15.99 kHz. The cut/boost range for all filter types is ± 12.0 dB.

The Q of each peaking filter may be set from 0.2 (wide) to 10.0 (narrow), while the Q of each high and low shelving filter may be set from 0.2 to 1.0. For shelving filters, Q values > 0.8 will create resonance peaks in the area of the corner frequency. Therefore when working with inputs whose level peaks are near 0 dBFS, the Q value for these filters should be set < 0.8 to avoid introducing positive gain into the signal.

1.2.4 Sample Rate Conversion

The ADMS 44.22 is capable of performing high-quality, real-time sample rate conversion (SRC) on any asynchronous single-wire (2-channel) AES input signal with sample rates ranging from 32 kHz to 96 kHz for all supported ADMS 44.22 sample rates. Sample rate conversion operates independently for each AES input, thus making it possible to accept multiple asynchronous digital sources running at different nominal sample rates. Sample rate conversion can be enabled/disabled on a channel-by-channel basis.

Any AES signal connected to a channel on which SRC is disabled must be externally synchronized to the ADMS 44.22 sample clock. External synchronization is accomplished through the Word Clock In and Word Clock Out connectors at the rear of the unit. The ADMS 44.22 cannot synchronize its internal sample clock to AES inputs.

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1.3 Synchronization and Clocking

The ADMS 44.22 supports internal and external sample clock rates of 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, and 96 kHz, and can be synchronized to external digital devices using the Word Clock In and Word Clock Out connectors on the rear panel.

1.4 Interconnect Port

Two ADMS 44.22 can be linked together to form a 16x2 stereo matrix switcher by connecting the Interconnect port of two units. When units are properly linked, outputs 1 and 2 of the Slave unit are summed into outputs 1 and 2 of the Master (pre ALC), respectively, while the Slave unit's physical outputs continue to be active.

The Interconnect port is a bi-directional LVDS signal that carries outputs 1 and 2 from the Slave, and word clock and bit clock from the Master. Because signals remain in the digital domain, there is no A/DD/A conversion loss, and no external clock signals are required to synchronize the two units. The Interconnect port cable does not carry control and configuration information. Each ADMS 44.22 unit must be controlled individually using the multi-drop RS-232 or USB setup methods described in section 2.9.

To create a 16x2 matrix, one unit must be configured as the Master, and the other unit as the Slave. The Master/Slave mode is set by the PWR UP switch (SW9) on the rear panel. When the Master and Slave units are powered up in their factory default configurations, both units are automatically synchronized: the Master unit is set to use the Internal sample clock, and the Slave to use the Master ADMS clock coming over the Interconnect port cable. Alternatively, either the Master or both Master and Slave units can be set to use Word Clock from an external source.

Note: *Because the Slave ADMS 44.22 is summed into the Master's outputs before the Master's output ALCs, when a Master's output ALC is enabled, the Slave's output ALC should be disabled.*

1.5 Preset Memory

The ADMS 44.22 allocates three non-volatile memory banks for storing and recalling all software and front-panel controllable parameter settings. Recalling a preset causes the current parameter settings to match the settings stored in the preset. Saving to a preset saves the current parameter settings to the preset.

The Factory Default Preset contains the factory defaults for all parameter settings. The Factory Defaults can be recalled at any time, but cannot be changed by the user. The User Preset is for user-defined setups and can be stored and recalled at any time.

The Last Saved Preset automatically stores the current parameter settings five seconds after any setting changes. This guarantees that in the event of a power failure, the most current unit settings can be automatically restored on power up. The Power Up Mode switch (SW6) on the rear-panel determines whether the Last Saved or the User Preset bank is recalled whenever the unit is powered up or reset. See section 4.9 for a list Factory Default settings and details on which parameters are

saved/recalled.

1.6 Serial Communication

1.6.1 Serial RS-232 Control

The ADMS 44.22 contains a comprehensive set of RS-232 commands for remotely controlling, querying, and updating the device from any standard RS-232 ASCII terminal or dedicated hardware controller at baud rates of 4800, 9600, 38400, or 57600. There are two RS-232 control modes: Burst Mode, and Menu Mode. Burst Mode uses short-form commands (and responses) with a prescribed syntax to facilitate scripting and integration into automated control systems. Menu Mode uses text-readable menus and prompts to guide the user. All ADMS 44.22 commands can be executed using Burst Mode commands, whereas Menu Mode provides access to only the most frequently-used setup parameters and contains no switcher commands.

1.6.2 Error & Status Reporting

When the Unit ID = 0, the ADMS 44.22 sends automatic Burst Mode messages to the terminal to report status changes in the following controls:

- **Switcher State**

If an input is connected or disconnected from either output via the front panel, remote control inputs, or serial commands, the unit sends an SL status message indicating the connection state of all eight inputs in both outputs.

- **AES Errors**

If an AES Error condition is detected on any digital input connected to Output 1, the unit sends an SD status message indicating which inputs have experienced AES errors since the last time the error register was cleared.

- **Silence Sensor Alarm**

If the unit detects that either the left and/or right side of Output 1 has fallen below a certain volume threshold for a prescribed period of time, the unit sends a Silence Sensor Alarm (SS) message indicating the silence alarm state for both outputs.

- **GPI Inputs**

In GPI Mode, whenever the state of a GPI input changes the unit sends an SPA status message indicating the current state of all 16 GPI inputs.

When the Unit ID is > 0, then the unit must be polled for status information.

1.7 External Control

1.7.1 Remote Control / GPI (PIP) Inputs

Sixteen general purpose parallel input (PIP) ports are available on the rear panel that can read both external switch closures and TTL/CMOS level input signals. The function of these inputs is determined at power up by the GPI switch (SW7) setting on the rear panel.

In Remote Mode (SW7 = OFF) all ADMS 44.22 front panel functions, with the exception of headphone and powered monitor levels, can be remote controlled via the first twelve inputs. Each remote control input controls a single front panel

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DESCRIPTION

switcher button, thus making it possible to remotely replicate front panel control operations without the need for complicated wiring or an intermediate device to interpret control inputs. A Monitor Mute input (13), not available from the front panel, mutes the powered monitor output. When the front panel controls are locked from user input out with the serial Front Panel Lock (CL) command, the remote control inputs are also locked out.

In GPI Mode (SW7 = ON) all sixteen general purpose input ports are available for monitoring external closures and/or TTL/CMOS inputs and reporting these closures to the serial port for monitoring by automation systems. Whenever the status of any of these inputs changes, a GPI status (SPA) message is automatically sent to the terminal on units whose ID=0. Units with ID >0 must be polled for GPI status.

1.7.2 Status & GPO Outputs

The ADMS 44.22 has nine general purpose open collector (OC) outputs on the rear panel. The function of these outputs is determined at power up by the GPO switch (SW8) setting on the rear panel.

In Status Mode (SW8 = OFF) the first eight OC outputs (OC1 – OC8) correspond to each of the eight input channels.

Whenever an input channel is connected either output channel, the corresponding OC output is turned on (active low), regardless of whether the input is dimmed or is actively in a fade up/down.

Therefore the OC1 – OC8 status outputs represent a logical OR condition between the Output 1 and Output 1 front panel input connect LEDs that input channel. When the Silence Sensor Alarm for Output 1 is triggered, the last output (OC9) goes on and the SS Alarm LED on the front panel is lit.

In GPO Mode (SW8 = ON), all nine OC outputs are under software control and may be used to trigger and control external devices, indicators, etc. They may be set to latch on (active low), unlatch, pulse once for a period determined by the OC Pulse Length setting, or toggle on/off continuously.

1.7.3 Relays

The ADMS 44.22 has four normally open SPDT relay outputs (K1 – K4) on the rear panel. Unlike the open collector outputs, relay function is not modal. Therefore the relays can be used at any time.

The relays are under software control and can be used wherever a switch closure is needed to trigger and control external devices, indicators, etc. They may be set to latch on (switch closed), unlatch (switch open), pulse once for a period determined by the Relay Pulse Length setting, or toggle on/off continuously.

1.8 Program Monitoring

The ADMS 44.22 provides stereo headphone and powered monitor outputs for monitoring either Output 1 or Output 2. Holding down the OP 2 button on the front panel for 2.5 seconds toggles the monitor source selection between the two outputs. The headphone and powered monitor outputs each have their own front-panel volume controls. Stereo PPM meters that are calibrated for both analog and digital output levels display the peak levels of the monitored output.

2 Setup & Installation

2.1 Mounting

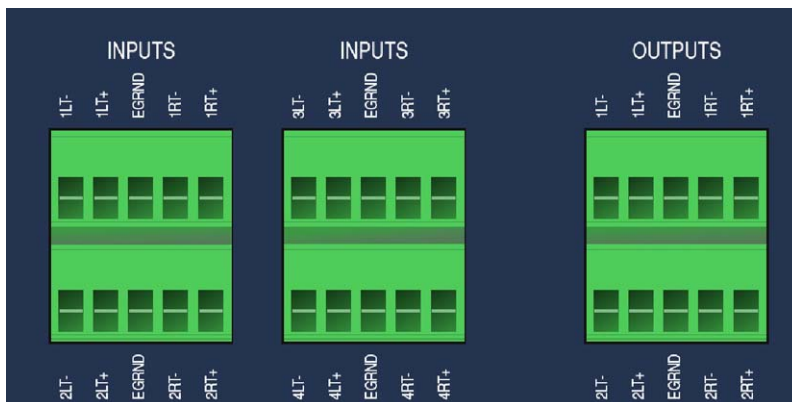
The ADMS 44.22 is designed to be rack mounted in a standard EIA 19" rack. It should be mounted in an area that is accessible from the rear and away from sources of heat and moisture. We recommend that you bench test and become familiar with the operation of the unit before permanently installing the unit in your facility.

2.2 Euroblock Connectors

The ADMS 44.22 interfaces to external equipment through removable Euroblock screw terminals. The terminals accommodate wire sizes from 16 - 28 AWG solid or stranded wire. Before installing a wire remove the screw terminal and turn each capture screw fully counterclockwise. Strip each conductor to a length of 0.25" and insert the conductor fully into the terminal. Turn the capture screw fully clockwise to secure the conductor.

2.3 Analog Inputs & Outputs

Four stereo analog inputs and two stereo analog outputs are available via 5-position removable Euroblock connectors on the rear panel, as shown in the picture below.



Analog Input/Output Connectors

Each input is balanced and has a 22k Ω input impedance. The analog input sensitivity can be electronically switched between +4 dBu and -10 dBV using a serial command from the terminal. For balanced input operation connect the + and - conductors of the source to the ADMS 44.22 + and - input terminals. For unbalanced operation connect the + and Gnd conductors of the source to the + and - input terminals.

Analog Outputs 1 and 2 are balanced low-impedance outputs that parallel AES Outputs 1 and 2, respectively. For balanced output operation connect the ADMS 44.22 + and - output terminals to the destination's + and - input terminals. For unbalanced output operation connect the + and EGRND terminals to the destination's + and - (respectively) input terminals.

Caution: *The analog outputs (including the powered monitor output) should never be unbalanced by grounding either the + or - side of the output.*



Installation of the ADMS 44.22 in high RF environments should be performed with care. It is recommended that all control and audio inputs and outputs use shielded cable and be looped through ferrite cores designed to suppress RF in the frequency bands present in the local environment. All shields should be tied to the "EGRND" terminal on each channel. The earth ground pin of the external power supply should be connected to station ground.

Surge protection with RF filtering such as the Tripp Lite "ISO-BAR 4" is also suggested for the external power supply. The purchase of an inexpensive uninterruptible power supply (UPS) will provide back up in case of power outages. For lightning protection devices, check out www.polyphaser.com and www.itwlinx.com.

2.4 Powered Monitor Output

The ADMS 44.22 provides a balanced line-level stereo output for monitoring Output 1 or Output 2 using powered monitor speakers.

The protocol for connecting the Powered Monitor outputs to balanced and unbalanced equipment is identical to that described for the analog outputs in the previous section.



Powered Monitor Connector

2.5 AES Digital Inputs & Outputs

The ADMS 44.22 provides four stereo AES inputs and two stereo AES outputs via 3-position removable Euroblock connectors on the rear panel, as shown in



AES Input/Output Connectors

the picture below.

AES Outputs 1 and 2 parallel Analog Outputs 1 and 2. When the Sample Rate is running at 88.2 or 96 kHz the AES inputs and outputs both run in AES single-wire (double speed) mode. In single wire mode both the left and right channels are transmitted at 2x the base AES frame rate (44.1 / 48 kHz). The ADMS 44.22 does not support double-wire mode, which transmits two consecutive samples of the same channel at the base AES frame rate and requires two AES connections to convey a stereo signal.

The AES inputs and outputs are transformer-balanced and have an 110Ω impedance. The inputs are ac-coupled, while the outputs are dc-coupled. Use only

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110 Ω AES digital cables to connect the ADMS 44.22 to and from your external AES devices. Regular analog microphone cables should never be used. Microphone cable has substantially lower bandwidth than 110 Ω AES digital cable and therefore even when used over short distances will severely degrade the quality of the AES signal.

2.6 Word Clock In/Out

The ADMS 44.22 Word Clock In and Word Clock Out jacks are 75 Ω BNC connectors located on the rear panel. The Word Clock input is internally terminated with a 75 Ω resistor, and therefore requires no external termination. The Word Clock Output is capable of driving any CMOS/TTL compatible word clock input. For optimum clock performance the word clock input of the external device should also be terminated with a 75 Ω resistor. Use only 75 Ω coaxial cables such as RG-59 or RG-6 that



are terminated with 75 Ω BNC, Interconnect, & RS-232 Connectors

Note: While 50 Ω coaxial cable such as RG-58 will work with the ADMS 44.22, signal reflections caused by impedance mismatches between the cable and the input terminating resistor will increase the clock jitter and degrade the performance of the A/D and D/A converters. The amount of degradation increases with cable length.

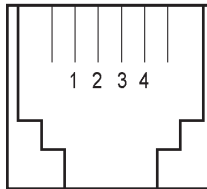
2.7 Interconnect Port

The ADMS 44.22 Interconnect port is an RJ45 Ethernet jack located on the rear panel, as shown in the picture above. To link two ADMS 44.22 units together to form a 16x2 matrix switcher, connect the Interconnect ports of the Master and Slave units together using a CAT-5E Ethernet cable wired in accordance with the EIA/TIA 568A or EIA/TIA 568B standard. Use the shortest distance possible, up to a distance of 10'. Substitute cable such as twisted pair telco is not acceptable.

Caution: Do not connect the ADMS 44.2 Interconnect port to Ethernet network equipment. Although the connectors and cabling are identical to those used for 10/100Base-T Ethernet connections, the Interconnect port signals are proprietary and are not compatible with the Ethernet electrical specification. Connecting the ADMS 44.22 to Ethernet hardware such as a router, switch, or computer may result in damage to the ADMS 44.22, your network hardware, or both.

2.8 RS-232 Serial Port

The ADMS 44.22 RS-232 port is a RJ11 (6P4C) telco connector located on the rear panel of the unit and is labeled 'Computer', as shown in the picture above. The unit is supplied with a Broadcast Tools® S9 RJ-11-to-DB9 modular adapter and a reverse-wired 4-conductor RJ11 telephone cord for connecting your computer or hardware control device's RS-232 port to the Computer jack on the rear panel. Use only the cord supplied with the unit or a suitable reverse-wired replacement such as the Radio Shack 279-0347 telco cord. The wiring of the adapter is shown below:



**MODULAR JACK
PIN NUMBERS**

RJ-11 Pin	DB9 Pin	ADMS 44.22 (perspective)
4	3	RS-232 Receive
3	2	RS-232 Transmit
2	5	Ground

The ADMS 44.22 can operate at 4800, 9600, 38400, and 57600 baud. The baud rate is set at power up with the BD0 and BD1 switches (SW4 & SW5) on the rear panel, and is set to 9600 from the factory. Any computer terminal program that supports ANSI terminal emulation can be used to control the ADMS (Procomm, Bitcom, VanDyke™, Windows® HyperTerminal, etc.). Use the following table to configure your terminal application or dedicated hardware controller device's communications settings:

Parameter	Terminal Setting
Baud Rate	Match ADMS 44.22
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None
Emulation	ANSI

RS-232 Terminal Communications Settings

With higher baud rates the overall RS-232 cable length between the terminal and the ADMS 44.22 should be kept to approximately 10', following the EIA recommendations for serial cable length. Longer cable runs may be used with lower baud rates (up to 50' at 9600 baud). Use standard straight-wired RS-232 DB9-F to DB9-M cables to extend the distance from your computer or hardware controller to the Broadcast Tools® S9 adapter. For distances longer than those recommended by the EIA, you can use any number of popular KVM or dedicated RS-232 extender devices such as the Gefen RS232 Extender (www.gefen.com).

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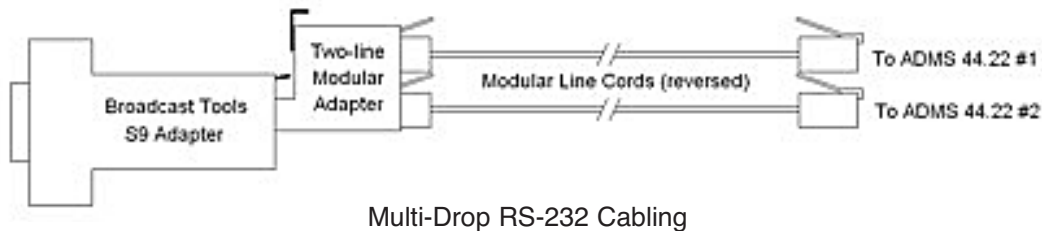


INSTALLATION

2.9 Controlling Multiple ADMS 44.22 Units

2.9.1 Multi-drop RS-232

Multiple ADMS 44.22 units can be connected to and controlled from a single serial RS-232 port by connecting the serial ports together in parallel with a duplex or multiplex RJ-11 modular telco adapter, such as the Radio Shack 279-357 or 279-433 adapters. An example of the cabling required for a two-unit setup is



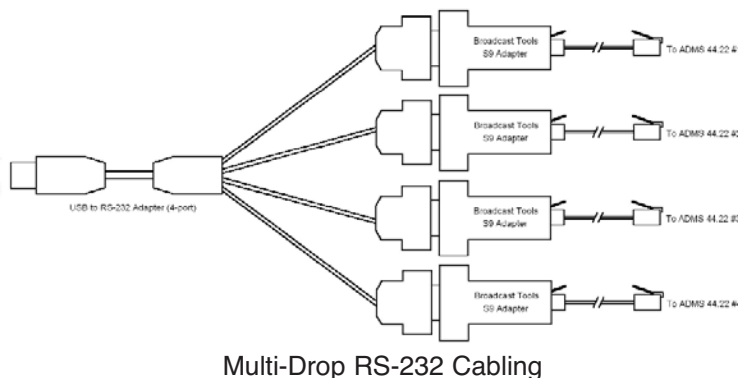
shown below.

When this 'multi-drop' RS-232 configuration is used, each ADMS 44.22 unit connected to the multi-drop port must have a unique Unit ID that is greater than 0. When the Unit ID is > 0 the RS-232 transmitter remains in a high-Z state (disconnected from the RS-232 bus) until the unit is sent a command. When the unit receives a command it enables its RS-232 transmit line, responds to the terminal, then immediately returns to the hi-Z state to prevent transmit bus conflicts with the other ADMS 44.2 connected to the serial port. Since Terminal Echo from the ADMS 44.22 is automatically disabled on units whose Unit ID is > 0 , enable local echo in your terminal application to see the characters as you type them.

When the unit ID = 0, the unit sends out automated terminal responses whenever the status of the unit changes. If a unit with ID = 0 is used in a multi-drop configuration, transmit bus contention may arise when communicating with units with ID > 0 , resulting in dropped or corrupted status data from Unit 0. Therefore ID = 0 should be used only when one unit is connected to a single serial port.

2.9.2 USB RS-232

Alternatively, multiple units can be controlled from a single USB port using a multi-port USB to RS-232 adapter. In this case, each ADMS 44.22 unit is connected to its

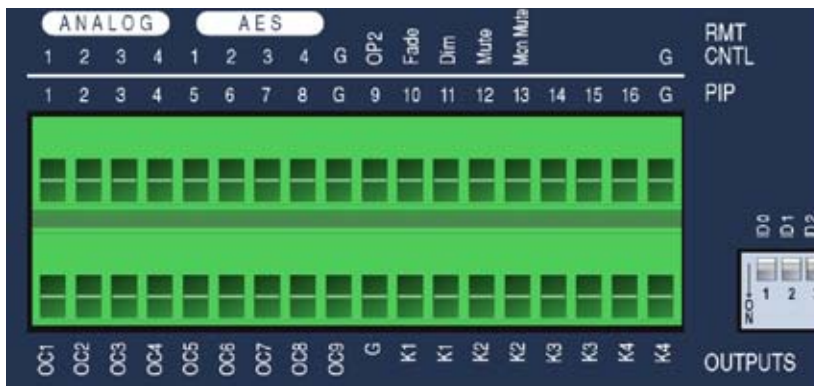


own RS-232 serial port, as shown in the diagram below.

The advantage of using a USB to RS-232 adapter is that each ADMS 44.22 unit can be set to ID = 0, allowing the terminal application to receive automated responses from each unit and Menu Mode operation. Terminal applications such as VanDyke™ CRT allow the operator to individually setup and control each RS-232 com port from within its own tab so that all ADMS 44.22 units can be controlled from a single terminal application.

2.10 Remote Control / GPI (PIP) Inputs

The sixteen Remote Control / GPI (PIP) inputs are available through the upper 18-



position removable Euroblock connector on the rear panel, as shown in the picture below.

In Remote Mode the first eight inputs control the Analog 1 - 4 and AES 1 - 4 front panel buttons, respectively, while Inputs 9 - 12 are control the OP2, Fade, Dim, and Mute buttons. Input 13 mutes the Powered Monitor output, while Inputs 14 through 16 are not used. In GPI Mode all 16 Inputs may be used.

Inputs are pulled high to 3.3 volts through an internal 20k Ω resistor and are activated by pulling the input to ground (active low) through a momentary external contact closure or TTL/CMOS open collector output capable of sinking at least 170 μ A of current. The inputs are internally debounced and require a minimum input pulse duration of 60ms for the input status to be set true (On). The inputs labeled 'G' are connected to internal ground and can be used for ground-referencing external input logic circuits.

2.11 Status / GPO Outputs

The nine Status / GPO (labeled OC1 through OC9) are available through the lower 18-position removable Euroblock connector on the rear panel, as shown in the picture in the preceding section. In Status Mode, outputs OC1 through OC8 reflect the status of Analog Inputs 1 - 4 and AES Inputs 1 - 4, respectively, while OC9 reflects the status of the front panel SS Alarm LED. In GPO Mode each of the OC outputs can be individually controlled from the terminal to control various external devices.

Each open collector outputs is active low, and can sink up to 350mA of current with TTL/CMOS output voltages. The ADMS 44.22 open collector outputs do not have internal pull-up resistors. Therefore to correctly drive TTL/CMOS logic inputs, an external DC voltage source (Voc) must be connected to the OC output through a pull-up resistor (Roc), as shown in the diagram below. Voc must range from 2 - 5Vdc and Roc should be calculated so that when the OC output is off (logic high), the OC output will have sufficient current to drive the TTL/CMOS input high. The terminal labeled 'G' at the center of the terminal block is connected to internal

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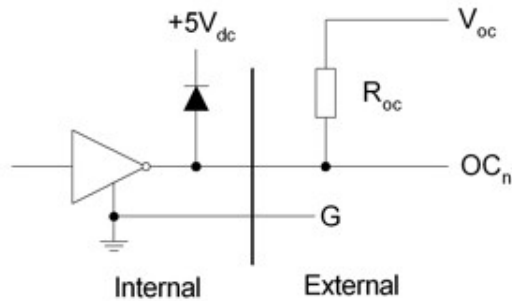


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ground and must be used as the ground reference for Voc.

2.12 Relays

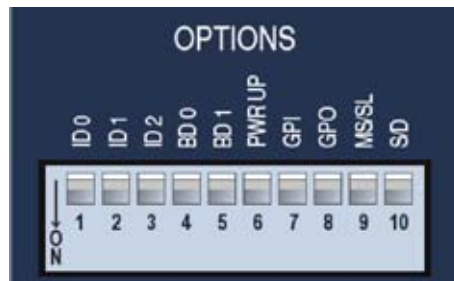
The four relay outputs (labeled K1 through K4) are available through the bottom 18-position removable Euroblock connector on the rear panel, as shown in the picture in the preceding section. Each relay can be individually controlled from the terminal to provide contact closures for external devices. The relay contacts are rated for 1A at 30V (AC or DC), and are linearly derated to 0.3A at 120V. Both relay



ADMS 44.22 Open Collector Output Wiring Diagram
contacts are electrically isolated from the unit.

2.13 Options Switch

The 10-position rear-panel options DIP switches control fundamental operating settings such as the Unit ID, RS-232 Baud Rate, and Master/Slave Mode. These switches are read only when the unit is powered-on or reset. The switch up position corresponds to OFF, and the down position corresponds to On.



The factory default settings for these switches are all OFF.

Switch	Label	Function	Default
1	ID 0	Unit ID	ID=0
2	ID 1		
3	ID 2		
4	BD 0	RS-232 Baud Rate	9600
5	BD 1		
6	PWR UP	OFF = Load User Preset ON = Load Last Saved Settings	Load User Preset
7	GPI	OFF = Remote Mode ON = GPI Mode	Remote Mode
8	GPO	OFF = Status Mode ON = GPO Mode	Status Mode
9	MS/SL	OFF = Master Mode ON = Slave Mode	Master Mode
10	S/D	OFF = Single Unit Mode ON = Dual Unit Mode	Single Unit Mode

Unit ID (SW1 – SW3)

The Unit ID is assigned using the first three DIP switches according to the following table:

ID 0	ID 1	ID 3	Unit ID
OFF	OFF	OFF	0
ON	OFF	OFF	1
OFF	ON	OFF	2
ON	ON	OFF	3
OFF	OFF	ON	4
ON	OFF	ON	5
OFF	ON	ON	6
ON	ON	ON	7

Unit ID Settings

When two or more units are connected to a single serial port using multi-drop RS-232, then each unit must be assigned a unique Unit ID. Units with ID=0 automatically transmit status data to the terminal when the unit status changes (see section 4). Units whose ID>0 do not transmit status data to the terminal; they must be polled for status. Units configured for stand-alone operation should therefore have their Unit ID set to 0.

Baud Rate (SW4 – SW5)

The RS-232 Baud Rate is set according to the following table:

BD 0	BD 1	Baud Rate
OFF	OFF	9600
ON	OFF	4800
OFF	ON	38400
ON	ON	56700

Unit ID Settings

Power Up Mode (SW6)

When the Power Up Mode switch is OFF, the User Preset is automatically recalled whenever the unit is powered up or reset. When ON, the Last Saved settings are recalled.

Remote/GPI Mode (SW7)

When the Remote/GPI Mode switch is OFF, the unit boots up in Remote Mode. When ON, the unit boots up in GPI Mode.

Status/GPO Mode (SW8)

When the Status/GPO Mode switch is OFF, the unit boots up in Status Mode. When ON, the unit boots up in GPO Mode.

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Master/Slave Mode (SW9)

Sets up the unit to run in Master or Slave Mode. In Master Mode, the unit acts as

Single/Dual Unit Operation (SW10)

When a unit is set to Master Mode, the Single/Dual Unit switch determines whether the Master receives audio inputs from the Interconnect port. In a Master/Slave setup, this switch must be set to Dual to receive audio from the Slave. When the unit is a stand-alone Master, then this switch must be set to single. In Slave mode this switch is ignored.

2.14 Power Supply

Install the 7-pin DIN power connector into the power receptacle on the ADMS 44.22. When ready, plug the power supply into the appropriate AC receptacle.



Failure to set SW10 to single when operating as a stand-alone Master may cause spurious noise to appear in outputs 1 and/or 2 coming from the unterminated LVDS Interconnect port input.

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3 Front Panel Operation

3.1 Front Panel Buttons

All basic switcher functions can be performed from the front panel by pressing one or a combination of the 12-switcher control buttons. The same functions can likewise be performed using the Remote Control inputs associated with each button. The following nomenclature is used in the function table that follows:

- S** Press the named button
- S1 + S2** Press the named buttons at the same time
- S** Press and hold the button for 2.5 seconds

Any action using an Input button applies equally to all 8 stereo input channels. Where ‘(+ OP 2)’ is displayed in the action sequence, adding the OP 2 button to the action causes the action to be performed on Output 2 instead of Output 1.



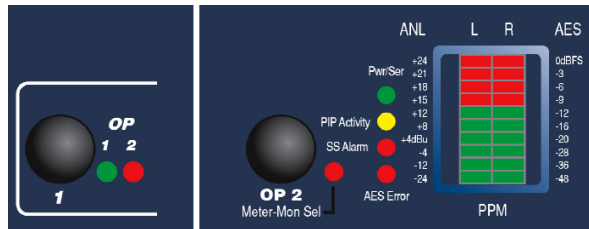
ADMS 44.22 Front Panel Buttons

Action	Mode	Input Condition	Result
Mute + Input (+ OP 2)	All		Disconnects Input from Output 1 (Output 2)
Mute	All		Disconnects all Inputs from both Outputs
Dim + Input (+ OP 2)	All		Dims Input in Output 1 (Output 2) to preset Dim Level
Dim	All	None Dimmed	Dims all Inputs in both Outputs
Dim	All	Some Dimmed	Dims all undimmed Inputs in both Outputs, and leaves Dimmed Inputs unchanged
Dim	All	All Dimmed	Returns all Inputs to unity gain in both Outputs
OP 2	All		Switches PPM meter, headphone, and powered monitor source between Output 1 and Output 2
Input (+ OP 2)	All	Connected	Disconnects Input from Output 1 (Output 2)
Input (+ OP 2)	Mix	Disconnected	Connects Input to Output 1 (Output 2)
Input (+ OP 2)	Interlock	Disconnected	Connects Input to Output 1 (Output 2) and Disconnects all other Inputs from Output 1 (Output 2)
Input (+ OP 2)	Overlap	Disconnected	Connects Input to Output 1 (Output 2) when Input button pressed, and Disconnects all other Inputs from Output 1 (Output 2) when Input button released
Input (+ OP 2)	Mix	Disconnected	Connects Input to Output 1 (Output 2)
Input (+ OP 2)	Interlock	Disconnected	Connects Input to Output 1 (Output 2) and Disconnects all other Inputs from Output 1 (Output 2)
Input (+ OP 2)	Overlap	Disconnected	Connects Input to Output 1 (Output 2) when Input button pressed, and Disconnects all other Inputs from Output 1 (Output 2) when Input button released
Input + Fade (+ OP 2)	All	Connected	Fades Down Input in Output 1 (Output 2)
Input + Fade (+ OP 2)	All	Dimmed	Fades Up Input from Dimmed level to unity gain in Output 1 (Output 2)
Input + Fade (+ OP 2)	Mix	Disconnected	Fades Up Input in Output 1 (Output 2)
Input + Fade (+ OP 2)	Interlock	Disconnected	Fades Up Input in Output 1 (Output 2) and simultaneously Fades Down all other Inputs connected to Output 1 (Output 2) at same rate.
Input + Fade (+ OP 2)	Overlap	Disconnected	Fades Up Input in Output 1 (Output 2) when Input button is pressed, and Fades Down all other Inputs connected to Output 1 (Output 2) at same rate when Input button is released.

ADMS 44.22 Front Panel Commands

3.2 Front Panel Controls & Indicators

The ADMS 44.22 front panel LED indicators, shown in the picture below, display of the following operational information:



ADMS 44.22 Front Panel Indicators

OP 1 Input Connected to Output 1 [Green]

Indicates when an in input is connected to Output 1. The switcher connection state is determined by the gain of the connection. When the gain = -INF, the input is Disconnected. If the Gain is \neq -INF, then the input is connected. Therefore when an input is faded down or disconnected, the OP 1/2 LEDs will not go off until the end of the fade ramp.

On = Connected

Flashing = Dimmed

Off = Disconnected (Muted)

OP 2 Input Connected to Output 2 [Red]

Indicates when an in input is connected to Output 2. Identical in all other respects to OP 1 LED.

Pwr/Ser Power/Serial Activity Indicator [Green]

Indicates when the unit is powered up, and when there is serial Tx/Rx activity present at the RS-232 port.

On = Powered On

Flashing = Serial Tx/Rx Activity

PIP Activity GPI (PIP) Activity Indicator [Amber]

Indicates when any one of the 16 GPI (PIP) inputs is active. This LED is active only in both Remote and GPI modes.

On = Any GPI Input Active

Off = No GPI Activity

SS Alarm Silence Sensor Alarm [Red]

Indicates when the Output 1 left and/or right signal level(s) falls below the Silence Sensor Threshold level for a period of time that exceeds the Silence Sensor Delay. For units with ID=0, an SS status message is also sent to the terminal whenever the Output 1 alarm status changes. The Silence Sensor Delay can be set anywhere from 2 to 9999 seconds, and the Silence Sensor Threshold from -24.0 to -96.0 dB.

On = Silence Detected

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Off = Program Present

AES Error AES Error Indicator [Red]

Indicates when an AES cyclical redundancy check (CRC), parity, eye-pattern, or biphasic error condition has been detected on any of the AES digital input channels that are connected to Output 1. Errors that are detected on AES inputs that are either disconnected or connected only to Output 2 are ignored. Once an AES Error is detected the AES Error LED remains lit for 10s and then goes off, even after the input has been disconnected from Output 1. The AES Error LED can also be cleared with the AESR command.

On = AES Error(s) Detected

Off = No AES Errors Detected

Meter-Mon Headphone/Powered Monitor Source Indicator [Red]

Located immediately to the right of the OP2 button, this LED indicates which output is being monitored by the PPM Meters, the headphone output, and the powered monitor output.

On = Monitor Output 2

Off = Monitor Output 1

PPM Meters Peak Program Meters

The PPM meters indicate L and R output levels for either Output 1 or Output 2, depending on the selected monitor source selection (see above). The PPM Meters use PPM ballistics, which have an extremely fast response to signal peaks, and a slow decay rate. The meters have both an analog scale on the left, and a digital scale on the right so that signal levels in both domains are always visible. The PPM meters are precisely calibrated so that the LED segment corresponding to the scale mark turns on at exactly the indicated level.

3.3 Headphone Level

The headphone level potentiometer (hdph lvl) controls the output level of the stereo 1/4" TRS headphone jack on the front panel. The output source for headphone jack is indicated by the Meter-Mon Sel LED located to the right of the OP 2 button. Holding the OP 2 button for 2.5 seconds switches the monitor source between Output 1 and Output 2.

3.4 Powered Monitor Level

The powered monitor potentiometer (PM lvl) controls the output level for the stereo powered monitor outputs on the rear panel. The output source for powered monitor outputs



ADMS 44.22 Headphone & Powered Monitor Controls

4 RS-232 Operation

4.1 Introduction

The ADMS 44.22 command set is based on the Broadcast Tools® ACS 8.2, 8 x 2 Matrix Audio Control Switcher command set. Many ACS 8.2 commands have been preserved in the ADMS 44.22 to allow users to easily integrate the ADMS 44.22 into facilities that currently support ACS 8.2 remote control. ADMS 44.22 commands that are backwards-compatible with the ACS 8.2 command set are indicated by the text “ACS 8.2” at the end of the command description.

4.2 Burst Mode Command Format

All ADMS 44.22 RS-232 Burst Mode command strings begin with an asterisk and end with a carriage return, according to the following structure:

*** <UNIT ID><COMMAND><CR>**

The <COMMAND> block generally consists of a one- to three-letter command together with one or more arguments. Command letters can be either upper-or lowercase. Spaces between characters a command string are not allowed. The following table details the allowed values for all command arguments. Allowed values for command-specific arguments are given in the description of the individual commands.

Argument	Meaning	Allowed Values
u	Unit ID	0 – 7
ii	Input Channel	01 – 04 (Analog Inputs 1-4) 05 – 08 (Digital Inputs 1-4)
o	Output Channel	1 – 2
r	Output Relay	1 – 4
c	Open Collector	1 – 9
s	Seconds	0 – 9, except where noted
t	Seconds (tenths)	0 – 9, except where noted
h	Seconds (hundredths)	0 – 9, except where noted
b	EQ Band	0 (All Bands) 1 – 3 (Individual Bands)
ic	Input Channel	0 (All Inputs) 1 – 4 (Analog Inputs 1-4) 5 – 8 (Digital Inputs 1-4)
oc	Output Channel	0 (All Outputs)
1 ? 2		
x, y	Command Specific	Upper and lowercase letters can be used interchangeably

ADMS 44.22 Command Argument Format

The proceeding sections describe the <COMMAND> block of the command string only. The asterisk, <UNIT ID>, and <CR> must be entered as described above to execute the command. Exceptions to the format are noted in the descriptions for the specific commands.



NOTE:

Users connecting the ADMS 44.22 to an ACS 8.2 controller must append all ACS 8.2 command strings with a carriage return to insure backwards compatibility.

4.3 Set-up Commands

MM Enable Menu Mode (ACS 8.2)

Enables on interactive text menu for viewing and changing frequently accessed setup parameters. Menu Mode is available only for unit ID=0. See section 3.15 for more details.

CL[x] Front Panel Lock (ACS 8.2)

Locks out front panel switcher control buttons and rear panel remote control inputs from user control.

[x] L = Lock; U = Unlock

CE[x] Enable Error Responses (ACS 8.2)

Enables error reporting for the unit. When Error Responses is Enabled and a correctly formatted command is received and executed, the unit will respond with RRR<CR><LF>. When an invalid command is received, the unit will respond with EEE<CR><LF>.

When Error Responses is disabled, no responses are sent at all.

[x] Y = Enable; N = Disable

ECHO[x] Echo Characters To Terminal

For command-line control using a terminal emulator such as Windows® HyperTerminal, ECHO returns all typed characters back to the terminal. If ECHO is Off, then any characters typed in the terminal will not be seen. ECHO is valid only for units with ID=0, and by default is disabled for units with ID>0.

[x] 0 = Echo Off; 1 = Echo On

OL[ic][x] Set Analog Input Operating Levels

Sets the nominal analog input operating level. The ADMS 44.22 is designed with 20dB of headroom above the nominal operating level before digital clipping occurs. Therefore a +10 dBV input signal will produce 0 dBFS with a Consumer operating level, and a +24 dBu input signal will produce 0 dBFS with a Pro operating level.

[x] 0 = Consumer (-10dBV); 1 = Pro (+4dBu)

SSS[x] Set Sample Clock Source

Sets the sample clock source for the unit. A Master can be set only to Internal or Word Clock, and a Slave can be set only to Word Clock or Master ADMS. The factory default for a Master unit is Internal, and Master ADMS for a Slave unit.

[x] 0 = Internal ; 1 = Word Clock; 2 = Master ADMS

Note: *A Slave should never be set to Word Clock when the Master is set to Internal. In this case the two units will become unsynchronized, and noise and pops will be heard in the audio sent by the Slave.*

SSR[x]Set Sample Rate

Sets the nominal sample rate of the system. When an external sample clock source is selected, sample rate setting must be set to match the sample rate of the external clock source. A mismatch between the programmed sample rate and the actual sample rate of the external clock will shift EQ band frequency centers and cause errors with all time-based computations, such as the ALC, fade rates, and time delays.

[x] 0 = 32 kHz; 1 = 44.1 kHz; 2 = 48 kHz; 3 = 88.2 kHz; 4 = 96 kHz

SRC[ic][x] Enable Sample Rate Conversion

Enables sample rate conversion for the AES digital input channels.

[x] 0 = Disabled; 1 = Enabled.

CSA[ssss] Set Silence Sensor Delay (ACS 8.2)

Sets the amount of time that must pass after an output's left and/or right signal level drops and remains below the Silence Sensor Threshold before the silence alarm for that output is triggered. Separate sensors are maintained for each output channel. When the silence alarm for Output 1 is triggered, the front panel silence sensor LED is lit, and for units with ID=0, an SS status message is automatically sent whenever the status of the Output 1 alarm changes. When the Silence Sensor Delay is set to Off, the silence sensor is disabled.

[ssss] 2 ? 9999 seconds; 0 = Off

SST[x]Set Silence Sensor Threshold

Sets the threshold below which an output's left and/or right signal level must drop for before the silence sensor timer begins counting. For each stereo output channel the detector monitors the sum of the L/R signals. If an output's signal level rises above the Silence Sensor Threshold before the Silence Sensor Delay is reached, then the timer for that output is reset.

[x] -96.0 ? -24.0 (dBFS)

UM[x] Set Switcher Mode

Sets the ADMS 44.22 Switcher Mode. The three Switcher Modes determine how the matrix switcher responds to front panel and terminal commands. Non-modal switcher commands perform the same action regardless of Switcher Mode, while modal switcher commands perform different actions depending on Switcher Mode. See section 1.2.1 for details.

[x] 0 = Mix; 1 = Interlock; 2 = Overlap

4.4 Reset and Firmware Update Commands

The programming and reset commands are special commands that are received and executed by the serial communications processor.

All other commands communicate with the ADMS 44.22 DSP processor. These commands are not unit-specific. Sending one of these commands affects all units connected to the terminal. For this reason they do not follow the standard command format. The syntax for these commands is exactly as shown, with no asterisk,

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Unit ID, or carriage return.

<TAB>-R	Reset unit
----------------------	-------------------

Reboots the DSP and reloads the settings specified by the power up DIP switch (User, or Last Saved). Pressing <TAB> causes unit ID=0 to send the following text response:

Download new firmware (D), Reset unit (R), any other key to quit:<CR><LF>

Press 'R' to reset the unit. If a unit with ID=0 is not present, this message will not be displayed. Nonetheless, pressing R after <TAB> will reset all units with ID≠0. Pressing any key other than 'D' or 'R' puts the unit back into normal operating mode.

<TAB>-D Download firmware

Puts the unit into Firmware Update Mode. Only one ADMS 44.22 can be updated at a time, and this unit must be set to ID=0. Firmware updating is not supported with multi-drop RS-232 communication. Therefore in setups where multiple units are connected to the same multi-drop RS-232 port, the unit whose ID≠0 must be disconnected from 232. To update the second unit, set its ID to 0 and update it in the same manner as the first.

Pressing <TAB> causes unit ID=0 to send the following text response:

Download new firmware (D), Reset unit (R), any other key to quit:<CR><LF>

Press 'D' to start the firmware download process. Pressing any key other than 'D' or 'R' puts the unit back into normal operating mode. When you press 'D', a second confirmation message appears in your terminal:

Download new firmware (y/n)?

Pressing 'Y' initiates an XModem file download, and pressing any other key puts the unit back in normal operating mode.

When you press 'Y, the following text appears:

Erasing Flash...

Entering XModem Mode...<CR><LF>

Firmware Update Mode requires the Xmodem transfer protocol to send the binary firmware image file to the ADMS 44.22 program flash memory. When the letter 'C' begins printing underneath the message, you may begin sending the ADMS 44.22 binary firmware file using standard Xmodem protocol (Xmodem 1k is not recommended). When the transfer is complete, the unit will reboot and load either the Last Saved settings or User Preset, according to the setting of the PWR UP switch (SW6).

If for any reason the Xmodem fails to complete, the ADMS 44.22 will time out

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after not receiving data for more than one second and go back to waiting for a new Download Firmware operation. At this point however, the program memory has been erased from flash and the unit becomes inoperable except for the ability to download new firmware. Once an XModem transfer fails, the baud rate of the unit reverts to the 9600 baud default for all subsequent serial communications. After a successful Download at 9600 baud, the unit reverts back to its programmed baud rate.

4.5 Relay and Open Collector Commands

OR[r][x] Set Relay State (ACS 8.2)

Sets the state of relays K1 through K4. In the Unlatched state the relays are open, and in the Latched state they are closed. The Pulse option causes the relay to latch for the amount of time specified by the Relay Momentary Pulse Length, then unlatch. The Toggle option causes the relay to toggle on and off with a 50% duty cycle equal to the Relay Momentary Pulse Length. When a relay is toggling, sending an Unlatch command stops the toggling and sets the relay to its Unlatched state.

[x] L = Latch; P = Pulse; F = Unlatch; T = Toggle

Note: *The toggle state is not stored in either Last Saved or User memory.*

CR[ttt] Set Relay Momentary Pulse Length (ACS 8.2)

Sets the amount of time a relay is latched on when pulsed, and sets the 50% duty cycle time when toggled.

[ttt] Time Range = 1 ? 100 (0.1 to 10.0 seconds)

OO[c][x] Set Open Collector State (ACS 8.2)

Sets the state of open collector outputs OC1 through OC9 when the unit is in GPO Mode. In Status Mode, the OC outputs are controlled by the front panel switcher buttons, and the OO command returns an EEE<CR><LF>. In the Unlatched state the open collector outputs are logic high (Off), and in the Latched state they are logic low (On). The Pulse option causes the outputs to latch for the amount of time specified by the Open Collector Momentary Pulse Length, then unlatch. The Toggle option causes the output to toggle on and off with a duty cycle equal to the Open Collector Momentary Pulse Length. When an open collector is toggling, sending an Unlatch command stops the toggling and sets the output to its Unlatched state.

[x] L = Latch; P = Pulse; F = Unlatch; T = Toggle

Note: *The toggle state is not stored in either Last Saved or User memory.*

CO[ttt] Set Open Collector Momentary Pulse Length

Sets the amount of time an open collector is latched on when pulsed, and sets the 50% duty cycle time when toggled.

[ttt] Time Range = 1 ? 100 (0.1 to 10.0 seconds)

4.6 Query Commands

Poll Poll Units (ACS 8.2)

Queries the RS-232 bus to detect which units are connected. In a multi-drop RS-232 setup, units respond with delays proportional to the Unit ID so that no units will have their transmitters enabled at the same time. Units respond by sending their Unit ID back to the terminal. For example, if ID=0 and ID=6 are present, the units respond with:

```
0
RRR
6
RRR<CR><LF>
```

Note: *The Unit ID prefix is not used with this command.*

U Display Unit Name/Software Version (ACS 8.2)

Returns the name of the unit and the current DSP software version in the following text-readable format:

```
ADMS44.22
Software Version: 1.00<CR><LF>
```

Y Display Configuration Settings (ACS 8.2)

Returns a list of many of the unit's configuration settings in the following text-readable format:

```
Sample Rate          48000.0
Sample Clock         Internal
Mix Mode             Overlap
Fade Rate            2.0
Relay Pulse Length   1.0
OC Pulse Length      1.0
Silence Sensor Delay 5.0
Silence Sensor Threshold -48.0
Error Responses      On
Terminal Echo        On
Front Panel Lock     Off
Unit ID              0
Baud Rate            57600
Power-up State       User
GPI                  Remote
GPO                  Status
Master/Slave         Master
Single/Dual          Single<CR><LF>
```

SL Display Audio Switcher Status (ACS 8.2)

Returns the current status of the audio switcher. Line 1 of the response displays which inputs are connected to Output 1, and line 2 displays which inputs are connected to Output 2. For units with ID=0, the SL message is automatically

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sent to the terminal whenever the state of the switcher changes for any input-output connection.

The switcher connection state is determined by the gain of the connection. When the gain = -INF, the input is Disconnected. If the Gain is \neq -INF, then the input is Connected. Therefore, when an input is faded down, the SL command will not return a Disconnected state until the fade completes. Similarly, when an input is disconnected, the SL command will not return a Disconnected state until the end of the 0.5s soft switch fade ramp.

[yicn] 0 = Disconnected; 1 = Connected

Response:

S[u]L[o],[yic1],[yic2],[yic3],[yic4],[yic5],[yic6],[yic7],[yic8] <CR><LF>

SP[xx] Display GPI (PIP) Port Status (ACS 8.2)

Returns the current status of any one of the sixteen GPI input ports when the unit is in GPI Mode. In Remote Mode this command returns an EEE<CR><LF>. When '0' is specified as the port range, the response uses the same format as that of the SPA command.

[xx] Port Range = 0 ? 16; 0 = All Ports

[yxx] 0 = Low; 1 = High

Response:

S[u]P,[xx],[yxx]<CR><LF>

SPA Display GPI (PIP) Port Status (all) (ACS 8.2)

Returns the current status of sixteen GPI input ports when the unit is in GPI Mode. In Remote Mode this command returns an EEE<CR><LF>. For units with ID=0, the SPA message is automatically sent to the terminal whenever the state of any GPI input changes.

[ygpn] 0 = Low; 1 = High

Response:

S[u]P,A,[ygp1],[ygp2],[ygp3],[ygp4],[ygp5],[ygp6],[ygp7],[ygp8],[ygp9],[ygp10],[ygp11],[ygp12],[ygp13],[ygp14],[ygp15],[ygp16]<CR><LF>

SS Display Silence Sensor Status (ACS 8.2)

Returns the current status of the Output 1 and Output 2 silence sensors. For units with ID=0, the SS message is automatically sent to the terminal whenever the state of the Output 1 silence sensor changes.

[yn] 0 = Silent; 1 = Not Silent

Response:

S[u]S,[yss1],[yss2]<CR><LF>

SR Display Relay Status (ACS 8.2)

Returns the current status of relays K1 through K4.

[ykn] 0 = Unlatched (Open); 1 = Latched (Closed)

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Response:

S[u]R,[yk1],[yk2],[yk3],[yk4]<CR><LF>

SO **Display Open Collector Status (ACS 8.2)**

Returns the current status of open collector outputs OC1 through OC9.

[yocn] 0 = Unlatched (High/Off); 1 = Latched (Low/On)

Response:

S[u]O,[yoc1],[yoc2],[yoc3],[yoc4],[yoc5],[yoc6],[yoc7],[yoc8],[yoc9]<CR><LF>

SD **Display AES Error Status**

Returns the contents of the AES error register for digital Inputs 1 through 4. Whenever an AES cyclical redundancy check (CRC), parity, eye-pattern, or biphasic error is detected on any digital input that is connected to Output 1, the error is latched in an AES error detection register; errors detected on inputs not connected to Output 2 are ignored. For units with ID=0, an SD message is automatically sent to the terminal whenever the AES register status changes. Once an AES error is latched for any given input, no additional SD messages will be sent until the register is cleared with the AESR command. If no AESR command is sent within 10s, then the AES error register is cleared and the LED turned off.

[ydn] 0 = No Errors; 1 = Error

Response:

S[u]D,[yd1],[yd2],[yd3],[yd4]<CR><LF>

AESR **Clear AES Error Register**

Clears the contents of the AES error register, turns off the front panel AES Error LED, and returns an SD message to confirm that the errors have been cleared.

[ydn] 0 = No Errors; 1 = Error

Response:

S[u]D,[yd1],[yd2],[yd3],[yd4]<CR><LF>

SRCD **Display Sample Rate Converter Settings**

Returns the sample rate converter settings for digital inputs 1 through 4 in a text-readable format:

Digital Input 1 SRC: Enabled

Digital Input 2 SRC: Enabled

Digital Input 3 SRC: Enabled

Digital Input 4 SRC: Enabled<CR><LF>

OLD **Display Analog Input Operating Levels**

Returns the operating level settings for analog inputs 1 through 4 in a text-readable format:

Analog Input 1: Pro (+4dBu)

Analog Input 2: Pro (+4dBu)

Analog Input 3: Pro (+4dBu)

Analog Input 4: Pro (+4dBu)<CR><LF>

4.7 Equalizer Commands

EQB[ic][b][x] Enable Equalizer Band

Enables input channel equalizer bands. The EQB command can be applied to a single band on a single input, all bands on a single input, a single band on all inputs, or all bands on all inputs.

[x] 0 = Bypassed; 1 = Enabled.

EQT[ic][b][x] Set Equalizer Band Type

Sets the equalizer type for input channel equalizer bands. The EQT command can be applied to a single band on a single input, all bands on a single input, a single band on all inputs, or all bands on all inputs.

[x] 0 = High Shelf, 1 = Peaking; 2 = Low Shelf

EQF[ic][b][x] Set Equalizer Band Frequency

Sets the center (peaking) or corner (shelving) frequency for input channel equalizer bands.

The EQF command can be applied to a single band on a single input, all bands on a single input, a single band on all inputs, or all bands on all inputs.

[x] Frequency range = 20.0 ? 20000.0 (Hz)

Note: When the sample rate is set to 32kHz, all equalizer bands whose frequency is >15999.0 Hz will automatically be set to = 15999.0 Hz. Sending an EQF command to set any equalizer band greater than this frequency will return an FFF<CR><LF>.

EOG[ic][b][x] Set Equalizer Band Gain

Sets the gain for input channel equalizer bands. The EQG command can be applied to a single band on a single input, all bands on a single input, a single band on all inputs, or all bands on all inputs.

[x] Gain Range = -12.0 -12.0 (dB)

EQQ[ic][b][x] Set Equalizer Band Q

Sets the Q for input channel equalizer bands. The EQQ command can be applied to a single band on a single input, all bands on a single input, a single band on all inputs, or all bands on all inputs.

[x] Q Range = 0.2 – 10.0 (Peaking Filters)

[x] Q Range = 0.2 – 1.0 (Shelving Filters)

EQD Display Equalizer Settings

Returns the settings for all input channel equalizer bands in a text-readable format:

Analog Input 1

B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0

B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0

B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0

Analog Input 2

B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0

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B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0
 B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0
 Analog Input 3
 B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0
 B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0
 B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0
 Analog Input 4
 B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0
 B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0
 B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0
 Digital Input 1
 B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0
 B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0
 B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0
 Digital Input 2
 B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0
 B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0
 B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0
 Digital Input 3
 B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0
 B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0
 B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0
 Digital Input 4
 B1 Bypassed T:Low Shelf G: 0.0 F: 20.0 Q: 1.0
 B2 Bypassed T:Peaking G: 0.0 F: 1000.0 Q: 1.0
 B3 Bypassed T:High Shelf G: 0.0 F:20000.0 Q: 1.0

4.8 ALC Commands

ALCB1[ic][x] Enable Input ALC

Enables input channel ALCs. The ALCB1 command can be applied to a single ALC on a single input, or all input ALCs.

[x] 0 = Bypassed; 1 = Enabled.

ALCB0[oc][x] Enable Output ALC

Enables output channel ALCs. The ALCB0 command can be applied to either one or both output channel ALCs.

[x] 0 = Bypassed; 1 = Enabled.

ALCO1[ic][x] Set Input ALC Target Output Level

Sets the target output level for the input channel ALCs. The ALCO1 command can also be applied to a single ALC on a single input channel, or all input channel ALCs. The ALC Target Output Level must be ? the ALC Threshold Level; setting ALC Target Output Level < the ALC Threshold Level sets the ALC Target Output Level = the ALC Threshold Level.

[x] Target Output Level Range = 0.0 ? -40.0 (dBFS)

ALCO0[oc][x] Set Output ALC Target Output Level

Sets the target output level for the output channel ALCs. The ALCO0 command can also be applied to either one or both output channel ALCs. The ALC Target Output Level must be \geq the ALC Threshold Level; setting the ALC Target Output Level $<$ the ALC Threshold Level sets the ALC Target Output Level = the ALC Threshold Level.

[x] Target Output Level Range = 0.0 \geq -40.0 (dBFS)

ALCT1[ic][x] Set Input ALC Threshold Level

Sets the target output level for the input channel ALCs. The ALCT1 command can also be applied to a single ALC on a single input channel, or all input channel ALCs. The ALC Threshold Level must be \leq the ALC Target Output Level; setting the ALC Threshold Level $>$ the ALC Target Output Level sets the ALC Threshold Level = the ALC Target Output Level.

[x] Threshold Level Range = -15.0 \geq -96.0 (dBFS)

ALCT0[oc][x] Set Output ALC Threshold Level

Sets the target output level for the output channel ALCs. The ALCT0 command can also be applied to either one or both output channel ALCs. The ALC Threshold Level must be \leq the ALC Target Output Level; setting the ALC Threshold Level $>$ the ALC Target Output Level sets the ALC Threshold Level = the ALC Target Output Level.

[x] Threshold Level Range = -15.0 \geq -96.0 (dBFS)

ALCR1[ic][x] Set Input ALC Ratio

Sets the ratio for the input channel ALCs. The ALCR1 command can also be applied to a single ALC on a single input channel, or all input channel ALCs.

[x] Ratio Range = 1.0 \geq 20.0 (dBFS)

ALCR0[oc][x] Set Output ALC Ratio

Sets the ratio for the output channel ALCs. The ALCR0 command can also be applied to either one or both output channel ALCs.

[x] Ratio Range = 1.0 \geq 20.0 (dBFS)

ALCD Display ALC Settings

Returns the settings for all input and output channel ALCs in a text-readable format:

Analog Input 1

Bypassed O:-20.0 T:-50.0 R: 1.5

Analog Input 2

Bypassed O:-20.0 T:-50.0 R: 1.5

Analog Input 3

Bypassed O:-20.0 T:-50.0 R: 1.5

Analog Input 4

Bypassed O:-20.0 T:-50.0 R: 1.5

Digital Input 1

Bypassed O:-20.0 T:-50.0 R: 1.5

Digital Input 2

Bypassed O:-20.0 T:-50.0 R: 1.5

Digital Input 3

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Bypassed O:-20.0 T:-50.0 R: 1.5
 Digital Input 4
 Bypassed O:-20.0 T:-50.0 R: 1.5
 Analog/Digital Output 1
 Bypassed O:-20.0 T:-50.0 R: 1.5
 Analog/Digital Output 2
 Bypassed O:-20.0 T:-50.0 R: 1.5

4.9 Preset Management Commands

CDEF Load Factory Default Settings (ACS 8.2)

Loads the factory default settings for the unit. The factory defaults for each

parameter are described in the table below:

Sample Rate	48k
Sample Clock	Internal (Master)
Master ADMS (Slave)	
Mix Mode	Overlap
Fade Rate	2.0s
Relay Pulse Length	1.0s
OC Pulse Length	1.0s
Silence Sensor Delay	5s
Silence Sensor Threshold	-48.0 dBFS
Error Response	On (Master)
Off (Slave)	
Terminal Echo	On
Front Panel Lock	Off
Analog Operating Level	Pro
Relays	Unlatched
Open Collector Outputs*	Unlatched (High/Off)
SRC Enable	Enabled
Input Assignment	In1>Out1 (only)
Dim Level	-10dBFS
Output Monitor Source	Output 1
ALC Enable	Bypassed
ALC Target Output	-20.0 dBFS
ALC Threshold	-50.0 dBFS
ALC Ratio	1.5
EQ Enable, All Bands	Bypassed
EQ Type, Band 1	Low Shelf
EQ Type, Band 2	Peaking
EQ Type, Band 3	High Shelf
EQ Gain, All Bands	0.0 dB
EQ Frequency, Band 1	20 Hz
EQ Frequency, Band 2	1.0 kHz
EQ Frequency, Band 3	20 kHz
EQ Q, All Bands	1.0

*Note: The state of the open collector outputs cannot be saved or loaded when the unit

is in GPO Mode.

PLF Load Factory Default Settings

Loads the factory default settings for the unit. Identical to the CDEF command.

PSU Save User Preset

Stores the current unit parameter settings into user preset memory. All parameters listed in the factory default settings table are stored into the user preset.

PLU Load User Preset

Loads the user preset from memory. If there is a conflict between a parameter setting in the user preset and the current operating mode of the unit (for example, a Master is changed to a Slave or visa versa), then the factory default for that parameter for the current mode will be loaded.

4.10 Audio Switcher: Non-Modal Connect Commands

Non-modal connect commands connect inputs to outputs without affecting any other connections; they behave identically in Mix, Interlock, and Overlap Modes. For example, issuing a non-modal connect command in Interlock Mode allows two (or more) inputs to be connected to the same output simultaneously without the existing input connection(s) being muted, effectively 'overriding' Interlock Mode.

F[xxxxxxx] Set All Inputs (ACS 8.2)

Sets the input/output connection state for all either input channels at once. Command arguments represent inputs 1 through 8 from L to R.

[x] A = Muted; B = Connect to Output 1 only; C = Connect to Output 2 only; D = Connect to Outputs 1 & 2

CONN[ic][oc] Connect Input To Output

Connects a single input to a single output. The CONN command can also connect a single input to both outputs, all inputs to a single output, or all inputs to both outputs.

[ii]3 Connect Input To Output 1 (ACS 8.2)

Connects a single input to Output 1 only.

[ii]4 Connect Input To Output 2 (ACS 8.2)

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Connects a single input to Output 2 only.

4.11 Audio Switcher: Modal Connect Commands

Modal connect commands connect inputs to outputs within the rules for Mix, Interlock, and Overlap Modes as though the same action were performed from the front panel. For example, issuing a modal connect command connects the selected input to the selected output, and mutes all other inputs connected to the same output.

[ii][o] Connect Input To Output (ACS 8.2)

Connects a single input to a single output. In Overlap Mode, if another input is already connected to the selected output, the [ii][o] command sets up an overlap condition between the two inputs. This condition is identical to that created by pressing and holding the front panel button of the selected input. When the 'held' input button (the overlap channel) is released, then only the overlap channel remains connected to the selected output, while all others are muted. Once an overlap condition is setup with the [ii][o] command, the E command (described below) mirrors the button release and ends the overlap.

Because both modal and non-modal commands can be issued in Overlap Mode, conditions can be created where an overlap condition can be created between the overlap channel and multiple channels, and where multiple channels can be connected with no overlap condition. In these circumstances the following additional rules govern the behavior of the switcher:

- An overlap condition can exist only when at least two channels are connected to a given output. Issuing an [ii][o] when no inputs are connected only connects the selected input to the selected output, but does not create an overlap condition.
- If an overlap condition already exists when the [ii][o] command is sent, then the existing overlap is ended (as though an E command were sent), and a new overlap condition created between the old and new overlap channels.
- Sending a non-modal connect, mute, or fade command to an overlap channel cancels the overlap condition.

[ii]A Connect Input to Outputs 1 and 2 (ACS 8.2)

Connects a single input to a both outputs. The same rules and conditions that apply to the [ii][o] command also apply to the [ii]A command.

[ii]E[o][tt] Connect Input To Output With Timed Overlap (ACS 8.2)

Connects a single input to a single output; if an overlap condition is created, the overlap is automatically ended [tt] tenths of a second later. The same rules and conditions that apply to the [ii][o] command also apply to the [ii]E[o][tt] command. The [ii]E[o][tt] command is valid only in Overlap Mode; sending the command in Mix or Interlock Modes returns an EEE<CR><LF>.

[tt] Time Range = 00 ? 99 (0 to 9.9 seconds)

E End Overlap (ACS 8.2)

Ends overlap condition for both outputs 1 and 2. The E command is valid

only in Overlap Mode; sending the command in Mix or Interlock Modes returns an EEE<CR><LF>.

4.12 Audio Switcher: Mute Commands

Mute commands are non-modal. Muting an input affects only the selected channel, regardless of the Switcher Mode.

MUTE[ic][oc]Mute Input in Output

Mutes a single input in a single output. The MUTE command can also mute a single input in both outputs, all inputs in a single output, or all inputs in both outputs.

[ii]MA[o] Mute Input in Output (ACS 8.2)

Mutes a single input in a single output.

[ii]MAMute Input In Outputs 1 & 2 (ACS 8.2)

Mutes a single input in both outputs 1 and 2.

M[o] Mute All Inputs In Output (ACS 8.2)

Mutes all inputs in a single output.

MA Mute All Inputs In Outputs 1 & 2 (ACS 8.2)

Mutes all inputs in both outputs 1 and 2

[ii]5 Mute Input In Output 1 (ACS 8.2)

Mutes a single input in Output 1 only.

[ii]6 Mute Input In Output 2 (ACS 8.2)

Mutes a single input in Output 2 only.

4.13 Audio Switcher: Dim Commands

Dim commands are non-modal. Dimming an input affects only the selected channel(s), regardless of the Switcher Mode. Sending any modal or non-modal connect command to a dimmed input un-dims the input. Sending a fade-up command to a dimmed input fades the input from the dimmed level up to unity gain, and sending a fade-down command to a dimmed input faders the input down from the dimmed level.

DM[ii][x] Dim Input To Preset Level in Output 1 (ACS 8.2)

Dims a single input to a preset level in Output 1 only, and sets the dim level for this input to match.

[x] 1 = -3 dB; 2 = -6 dB; 3 = -10 dB; 4 = -15 dB; 5 = -20 dB

DME[ic][oc][x] Dim Input In Output

Dims a single input in a single output to the dim level specified by the DML (or DM) command. The DME command can also be applied to a single input on both outputs 1 and 2, all inputs on a single output, or all inputs on both

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outputs.

[x] 0 = Un-dim (reset gain to unity); 1 = Dim

DML[ic][x] Set Dim Level

Sets the dim level for one or all input channels. The dim level for an input is used for dimming the input in both outputs 1 and 2.

[x] Dim Range = 0.0 ? -20.0 (dB)

DIMD Display Dim Settings

Returns the dim settings for all input channels in a text-readable format:

Analog Input 1:-10.0

Analog Input 2:-10.0

Analog Input 3:-10.0

Analog Input 4:-10.0

Digital Input 1:-10.0

Digital Input 2:-10.0

Digital Input 3:-10.0

Digital Input 4:-10.0<CR><LF>

4.14 Audio Switcher: Fade Commands

Fade commands are modal. Fading an input up or down in Interlock and Overlap Modes initiates and automatic crossfade by fading down any connected inputs at the same rate.

FD[ii] Fade Down Input In Output 1 (ACS 8.2)

Fades a single input down in Output 1 only.

FU[ii] Fade Up Input In Output 1 (ACS 8.2)

Fades a single input up in Output 1 only.

FUD[ic][oc][x] Fade Input In Output

Fades a single input up or down in a single output to at the rate specified by the FDL command. The FDL command can also be applied to a single input on both outputs 1 and 2, all inputs on a single output, or all inputs on both outputs.

[x] 0 = Fade Down; 1 = Fade Up

FDL[x] Set Fade Rate

Sets the fade rate for all channels. Fade rate applies for both fade up and fade down commands. When a fade is applied to a dimmed channel, the fade times are adjusted to match the time taken to fade between the same gain levels on a non-dimmed channel.

[x] Fade Rate Range = 0.5 ? 10.0 (seconds)

4.15 Menu Mode

Menu Mode is an interactive text entry mode that allows the user to view and change many of the most commonly accessed settings without having to refer to the RS-232 command set documentation.

MM Enable Menu Mode (ACS 8.2)

Enters Menu Mode. Entering Menu Mode causes the main menu to be displayed.

1 - Sample Rate	48000.0
2 - Sample Clock	Internal
3 - Sample Rate Conversion	---
4 - Mix Mode	Overlap
5 - Analog Operating Level	---
6 - Dim Level	---
7 - Fade Rate	2.0
8 - Relay Pulse Length	1.0
9 - OC Pulse Length	1.0
10 - Silence Sensor Delay	5.0
11 - Silence Sensor Threshold	-48.0
12 - Error Responses	On
13 - Terminal Echo	On
14 - Front Panel Lock	Off
D - Set Factory Defaults	
Q - Quit	

Enter Choice:

At the prompt, enter the number corresponding to the setting you wish to change, then press <Enter>. A submenu appears prompting you to enter a value for the setting. For example, the following submenu appears when you enter '1' at the main prompt:

Set Sample Rate (0 = 32kHz, 1 = 44.1kHz, 2 = 48kHz, 3 = 88.2kHz, 4 = 96kHz):

Enter the number corresponding to the desired value, then hit <Enter>. The setting changes you are returned to the main menu. For settings 12 through 14, simply enter the setting number and hit <Enter> to toggle the value. Entering a 'D' at the main prompt loads the factory defaults (same as CDEF and PLF commands). Entering Q at the main prompt exits menu mode and returns you to command control.

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Specifications

Nominal Input Level	+4 dBu or -10dBV (selectable)
Maximum Input Level	+23.5 dBu \pm 0.1dB @ +4 dBu Analog Operating Level +9.3 dBV \pm 0.1dB @ -10dBV Analog Operating Level
Analog Input Impedance	> 22 k ohm, balanced, dc-coupled
Maximum Output Level	+ 23.5 dBu \pm 0.1dB = 0dBFS
Analog Output Impedance	> 100 ohm, balanced, ac-coupled
Frequency Response, A/D-DA:	-/+0.25db, 20 Hz to 20 kHz @ 44.1 & 48 kHz Sample Rates -/+0.25db, 20 Hz to 40 kHz @ 88.2 & 96 kHz Sample Rates
Dynamic Range	90dB, A-weighted, 44.1 & 48 kHz Sample Rates 90dB, A-weighted, 88.2 & 96 kHz Sample Rates
THD+N	0.01%, 44.1 & 48 kHz Sample Rates 0.01%, 88.2 & 96 kHz Sample Rates
Stereo Separation	>90dB, 20Hz to 20kHz, Analog-Analog
A/D and D/A Converters	24 bit A/D, 24-bit D/A
DSP Processing	32-bit floating point
Supported Sample Rates	32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz
AES Inputs	32 kHz to 96 kHz, Single-wire
AES Input Impedance	110 ohm, transformer balanced, ac-coupled
AES Output Impedance	110 ohm, transformer balanced, dc-coupled
Analog I/O Connectors	5-position 0.15" LS Euro Removable screw terminals
Digital I/O connectors	3-position 0.15" LS Euro Removable screw terminals
EQ, per input channel	High Shelf, Peaking, Low Shelf
Fade Up / Down Rate	0.5 to 10 seconds
Dim Levels	0.0 to -20.0 dB below reference
Phones Out level	24 to 600 ohm, depends on the headphone impedance.
Powered Speaker Output level	+23.5 dBu \pm 0.1dB = 0dBFS
GPI Inputs	TTL/CMOS-compatible, open collector contact closures. Input pulled to +3.3v DC internally through 20k Ω resistor.
GPO Outputs	TTL/CMOS-compatible open collector output. Requires external pull-up resistor tied to +2 to +5Vdc.
Relays	Contact rated for 1A @ 30V (ac or dc), and 0.3A @ 120V (ac or dc).
Power	34.5 Vac/ct @ 500 ma / 10.5 Vac @ 1 amp, 120 Vac 50-60 Hz "Lump in the line" power transformer. Supplied.
Mechanical	19" x 1.75" x 6.0" (WHD) / Weight: 5.0 lbs.

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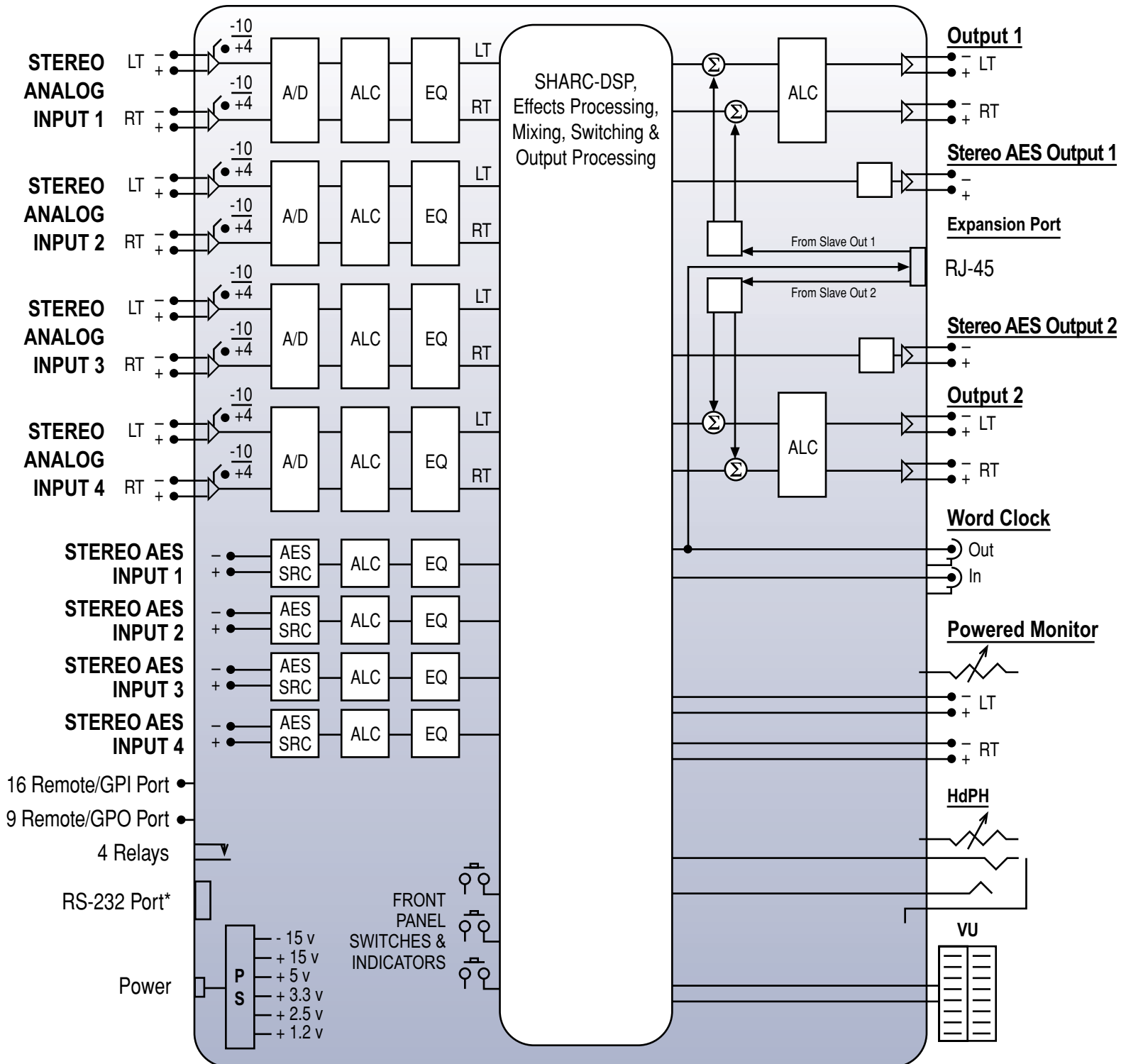
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Functional Diagram

A signal flow diagram of the ADMS 44.22 (configured as a Master) is shown below:



* Optional Broadcast Tools ® USB-RS232 Smart Adapter Cable or ESS-1 Ethernet to Serial adapter.