Dan Dugan Sound Design

Model E-3A Automatic Mixing Controller

User Guide

Release Date: November 2017
Version: 1.7
Author: Rob Wenig

Important Safety Instructions and Warnings

The Model E-3A's circuitry is made in the USA and meets applicable national safety standards.

Standards Compliance

The third-party power supply provided with this product has been certified to comply with UL and CE.

Safety Instructions

1. Read these instructions.

2. Keep these instructions.

3. Heed all warnings.

4. Follow all instructions.

5. Do not use this apparatus near water.

6. **WARNING!** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

7. Clean only with dry cloth.

8. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

9. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

10. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

11. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

12. Only use attachments/accessories specified by the manufacturer.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.

14. **WARNING!** Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

15. **WARNING!** To reduce the risk of electric shock, DO NOT REMOVE COVER. No user serviceable parts inside.

Warranty Statement

Warranty: One year parts and labor

Dan Dugan Sound Design warrants that Model E-3A hardware will be free from defects in components and workmanship for a period of 12 months from the date of invoice. During the warranty period, Dan Dugan Sound Design will cover the cost of all parts and labor to remedy the defect, or replace products which prove to be defective. Dan Dugan Sound Design is not obliged to honor this warranty if the hardware has failed to be maintained and operated as specified by Dan Dugan Sound Design, in the accompanying documentation, or other than in accordance with industry standards. Defects caused by unauthorized modifications, misuse, negligence, act of God or accident are not covered by this warranty. Software is provided as a convenience, but due to the wide variety of computer systems, cannot be guaranteed to work. This Limited Warranty is exclusive and no other warranty is expressed or implied. Dan Dugan Sound Design does not warrant that Dan Dugan Sound Design software, or any third-party software, is error free. Third party branded or manufactured goods are supplied by Dan Dugan Sound Design with care but without responsibility and subject only to third party suppliers' warranties. In all other respects Dan Dugan Sound Design is not liable for consequential damages.

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Chapter 1: Introduction

The Dugan Model E-3A Automatic Mixing Controller helps professional audio mixers handle multiple live mics without having to continually ride their individual faders. This signal processor can be patched into the input insert points of an audio mixing console. Then each mic channel is processed in the Dugan controller and returned to the console for mixing. Alternatively, internal mix buses in the Model E-3A can be used to sum channels.

The Dugan detects which mics are being used and makes fast, transparent cross-fades, freeing the mixer to focus on balance and sound quality instead of being chained to the faders. The Model E-3A crossfades unscripted dialogue which eliminates cueing mistakes and late fade-ups. It also reduces comb filtering from adjacent mics while avoiding the choppy and distracting effects common to noise gates.

The Model E-3A supports a broad spectrum of live mixing applications:

- Conference reinforcement, video trucks

- Houses of worship

- TV news and sports panels, reality and game shows

- Wireless mics for theater

- Boardrooms and civic meeting rooms

- Teleconferencing and distance learning

The Model E-3A includes three patented automatic mixing algorithms:

- Dugan Speech System™ reduces noise and feedback in dialog applications

- Dugan Music System™ reduces ambient noise, bleed, and feedback when mixing a musical group

- Dugan Gain Limiting™ protects against feedback when using the Music System

The Model E-3A can:

- process up to 32 channels (16 AES and 16 ADAT);

- be remote controlled from the Dugan Control Panel for Java (included), Dugan Control Panel for iPad (sold separately), and the Dugan Model K Control Surface;

- be directly controlled from its own front panel;

- link with other Dugan automatic mixing controllers to create a larger system;

- partition channels into one to three groups that can span linked units;

- create separate systems that do not interact (i.e., for separate studios);

- conveniently connect multiple devices via three network ports;

- be powered by PoE.

Chapter 2: Theory of the Speech and Music Systems

Dugan Speech System

The Dugan Speech System is a patented and trademarked automatic mixing function. The Speech System distributes the gain of one open microphone over the entire system, maintaining a natural ambience. This is nothing like the annoying fluctuation of levels and uneven ambience in a conventional gating system.

The system automatically manages any number of live mics in unpredictable dialogue situations. When one person speaks, that mic's gain fades up instantly, and the others down. When the speaker pauses, all mics fade to medium gains that sum to equal one mic at full gain. The result sounds like passing one mic around among the speakers. When several people talk at once, the gain is shared.
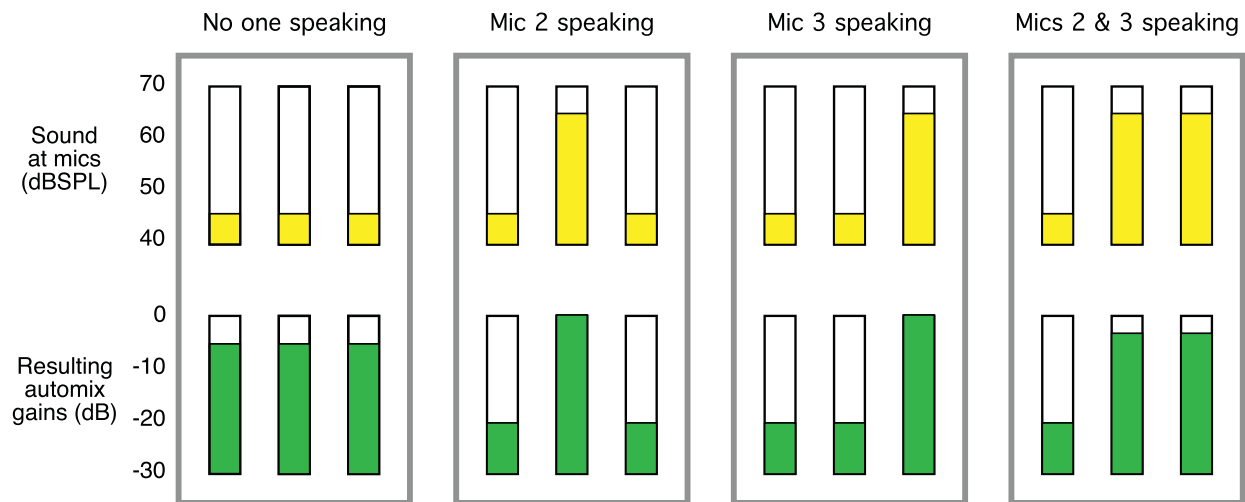
Figure 2-1 Four snapshots of a three-mic system. The bottom row represents the automixer's virtual faders.

Figure 2-1 shows the Speech System automatic mixing in action with a three-mic system with no speaker, one, and two speakers:

- **No one speaking**: The sound levels at all mics are low. The system fades all channels to medium gains that sum to the equivalent of one mic at full gain.
- **One person speaking**: The system fades their gain to full, while fading down the other two inputs.
- **A different person speaking**: The system fades their gain to full, while fading down the other two inputs.
- **Two people speaking**: The system shares the gain between them, while fading down the other input.

Insert Patching

Figure 2-2 Post-fader insert patching

The Dugan Speech System is best patched post-EQ, post-fader, pre-compressor:

- **Post-EQ**: Equalization can be applied to different mic types so they sound more alike, which benefits both the sound quality and the automixing process.

- **Post-fader**: This allows muting channels on the console by pulling down the fader or activating the mute button. Patching the Dugan pre-fader leaves the mic in the automix even when the fader is down or the console channel is muted.

  Most analog consoles only have pre-fader inserts. You can use Dugan automixing with these consoles but you must be careful to mute channels by muting on the Dugan, not the console.

- **Pre-compressor**: The Dugan Speech System works on the level differences between channels. Compression reduces level differences between channels, making automixing less effective. It is OK to patch post-compressor if only occasional peak limiting occurs. However, if compression is active during normal speech, better results will be obtained by patching the Dugan pre-compressor.

Dugan Music System

Music System

The Music System is a soft-gating ducking system with its threshold set by an audio signal, typically from a mic measuring the ambient sound level. Each channel has a 2:1 expansion ratio below the floating threshold.

The Music System can also be used to duck an audience mix when the people on stage talk, attenuating the sound of the PA in the room. Use an aux send of the stage vocal mix to supply the threshold signal instead of a mic.

The following example (Figure 2-3) shows how the Music System works with three background vocalists.

- **No one singing**: The system keeps all channels at a low gain.

- **One person singing**: The system fades their gain to full, while the other two inputs stay low.
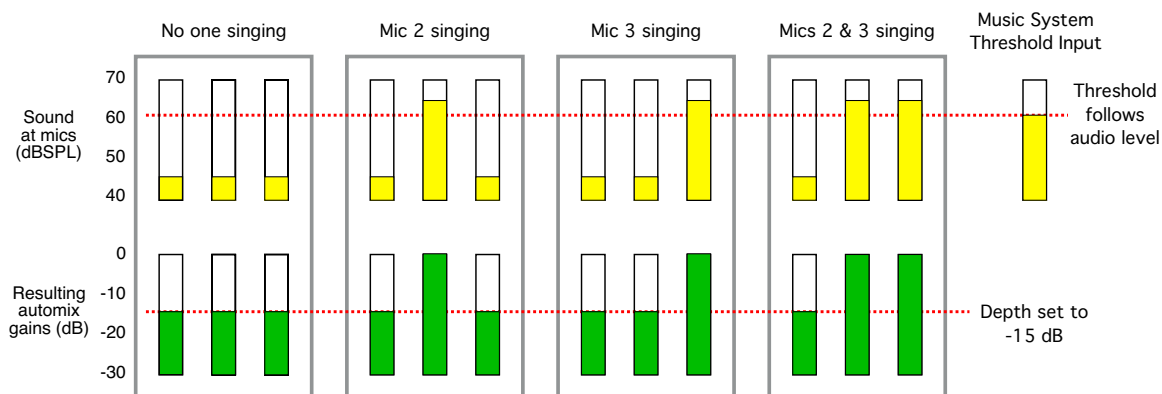
Figure 2-3 The Dugan Music System; the bottom row represents the automixer's virtual faders.

- **A different person singing**: The system fades their gain to full, while the previous singer's mic fades down, and the other input stays low.

- **Two people singing**: The system gives their channels full gain, while the other input stays low.

  Unlike the Speech System, there is no interaction between inputs, so the artistic mix is preserved.
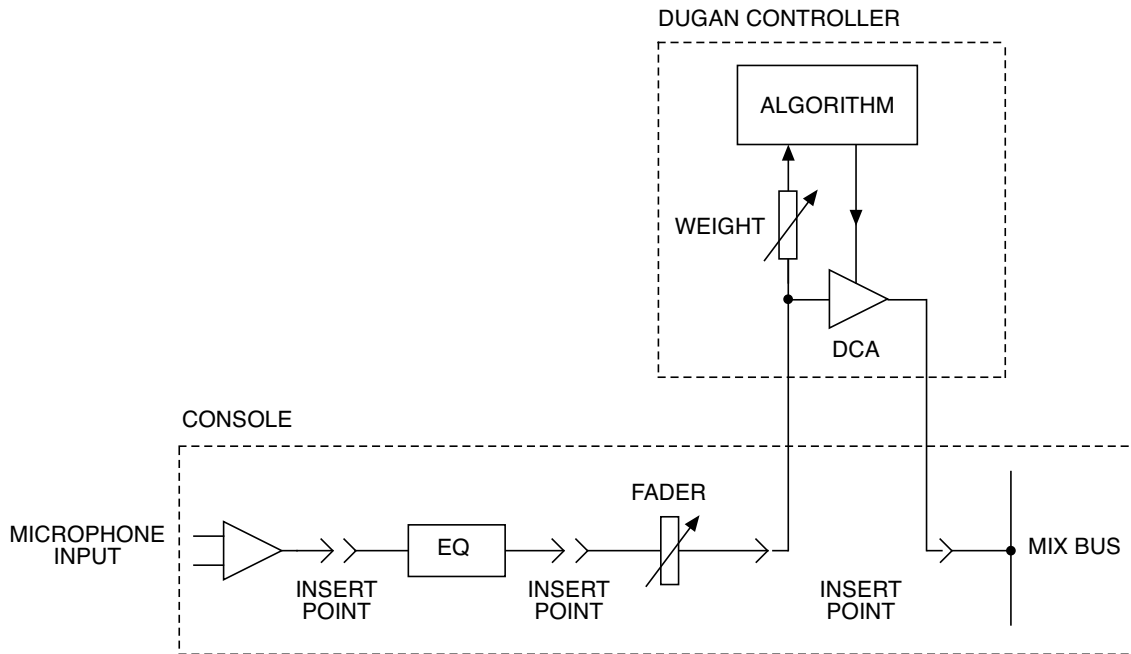
Insert Patching
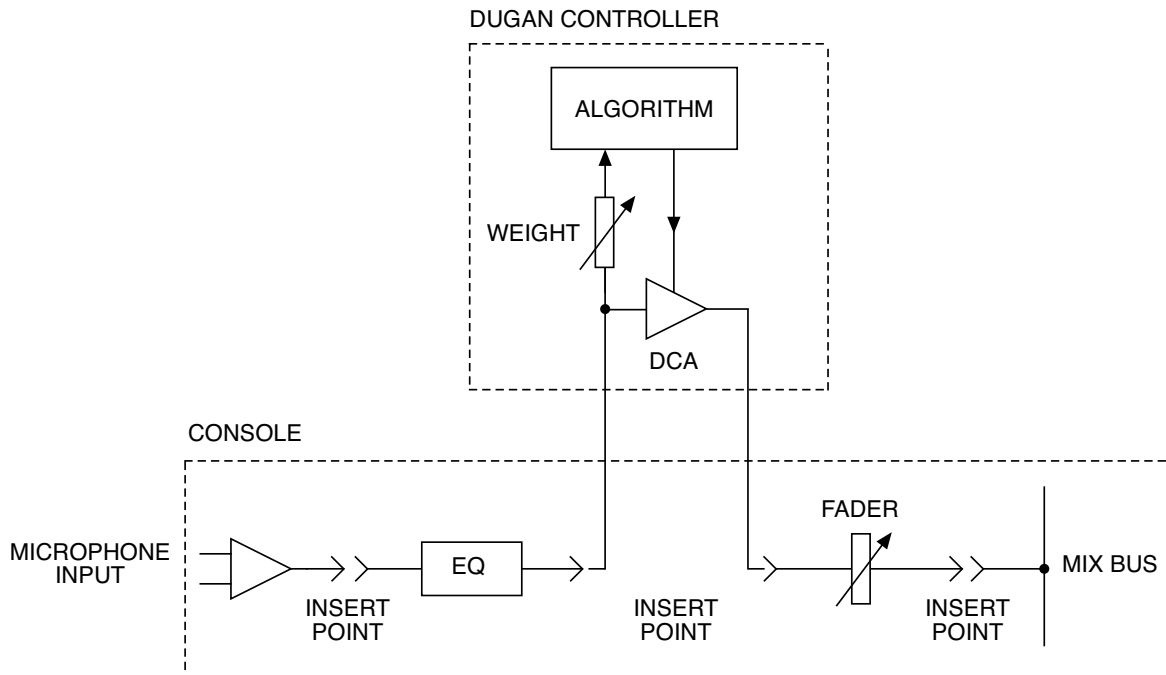
Figure 2-4 Pre-fader insert patching

The Dugan Music System is best patched post-EQ, pre-fader, pre-compressor:

- **Post-EQ**: Automixing works better if it operates on the same sound you hear, therefore it should occur post-EQ.

- **Pre-fader**: This allows the automix expansion threshold to remain stable while adjusting the mix with the faders.

- **Pre-compressor**: The Dugan Music System works better with consistent ambience caused by bleed from neighboring voices and instruments. It is OK to patch post-compressor if only occasional peak limiting occurs. However, if compression is active during normal singing or playing, better results will be obtained by patching the Dugan pre-compressor.

Gain Limiting

Gain Limiting is used along with the Music System—the Speech System doesn't need it. It reduces master gain as new mics become active, thus avoiding feedback and noise. This is commonly called *NOM* (number of open mics) gain adjustment. Unlike NOM functions on other systems, Dugan Gain Limiting does not base its gain limiting calculation on the number of open mics. Instead it sums the gains of all active channels (including partially attenuated channels), compares them to a gain threshold, and reduces the gain appropriately.
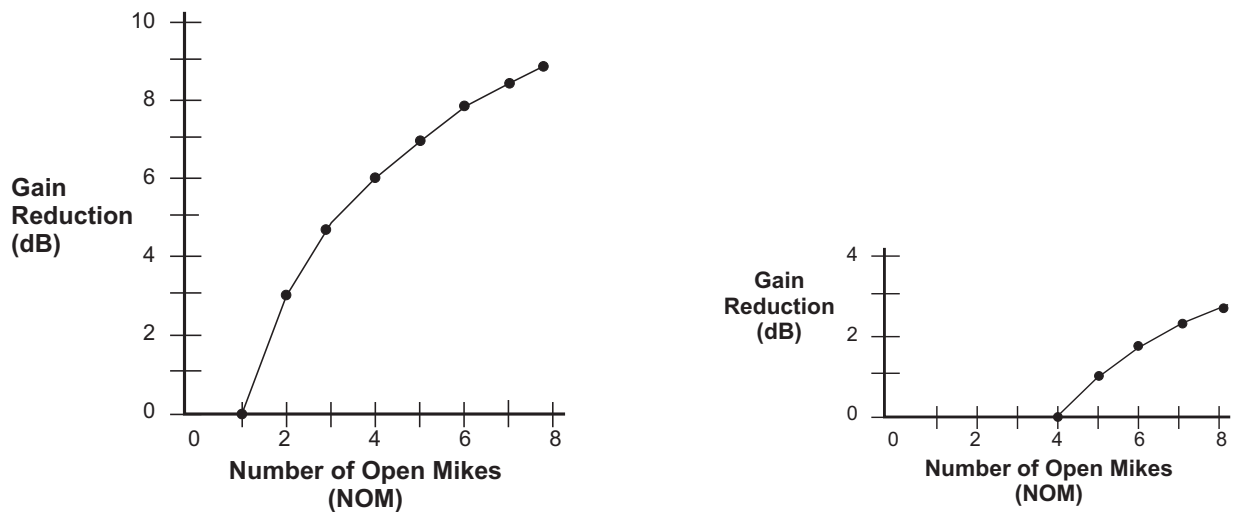
Figure 2-5 NOM and gain reduction: NOM =1 (left); NOM = 4 (right)

Conventional automatic mixing implementations always assume an NOM of 1. The Dugan's unique implementation allows you to set the number of mics that will operate at full gain before gain limiting occurs. For example, if there is enough gain before feedback to tolerate four open mics, the gain limit can be set to 4. Gain reduction begins when the fifth mic turns on.

NOTE: *Since the Model E-3A has no master audio channel, Gain Limiting reduces the gain on all channels in the group for which **NOM** is active.*

Chapter 3: Quickstart

This section provides step-by-step instructions to help you get started quickly using the Dugan Speech System to mix up to 16 channels of AES I/O. If you need more than 16 channels of I/O or wish to use the Dugan Music System, skip this chapter.

In this Quickstart you will:

- Execute a system reset.
- Set the audio interface to AES using the back panel switch.
- Patch inserts to the console.
- Set console input gains.

Front Panel

The front panel has a display, navigation arrow buttons, and a dual-function encoder knob that can be pushed or turned. The cursor is a box around a selected item that is moved using the navigation arrow buttons.

NOTE: *Pressing the* **ENTER** *button or the knob performs the same function. We will refer to the item which is easiest to use in the context.*

System Reset

This System Reset command sets all parameters to factory default settings and clears label text. We recommend executing a System Reset before starting a new installation. This is just like zeroing a console before a show.

To reset the system:

1. Navigate to **MENU** on the front panel, and press **ENTER**.
2. Select **Scene Memory** and press **ENTER**.
3. Navigate to **Recall**, turn the knob to select **Factory Defaults**, and press **ENTER**.
4. Set the **NORM-SLAVE** switch on the back panel to **NORM** (up) for unlinked operation.

Audio Connections

Move the **AES–ADAT** switch on the back panel to the **AES** (up) position.

The DB-25 connectors (wired with the Tascam convention) are used for digital I/O. Since digital mixers use a variety of I/O connectors, you must obtain a DB-25 digital breakout adapter cable to connect to the console.

Figure 3-1 Model E-3A back panel

Patching Console Inserts

To interface the Model E-3A using AES connections:

- In the console's internal patching system, route each Model E-3A channel as a post-fader, pre-compressor insert to each mic channel (see figure below).

Figure 3-2 Post-fader, pre-compressor insert patch for the Dugan Speech System on a Yamaha digital mixer. If compression is needed, on this console patch it in **INSERT 2**.

Setting Console Input Gains

Dugan automixers require enough console preamp gain so the algorithm can measure the ambient noise level on each channel.

To set the console gain level:

1. Navigate up to **MENU** and press **ENTER**.

2. Use the navigation arrows to select **Channel View** and press **ENTER**.

   This displays the status of all channels, and like the Top Pane in the Dugan Control Panel, allows you to select a block of eight channels to view in detail.

3. Use the navigation arrows or turn the knob to select the desired block.

Figure 3-3 All Channels screen

4. Press the **ENTER** button or the knob to switch the display to that eight-channel block.

   The Eight Channels screen appears.

Figure 3-4 Eight Channels screen

5. When no one is talking, set each console preamp so there is enough gain in each channel so the level LED at the top of the Dugan front panel display stays on and all meters float at about the same gain.

   This procedure assures smooth automatic mixing.

Linking

Up to eight Dugan units can be linked into a single automatic mixing system. The audio I/O for each unit must be connected individually. Linking passes only control information between Dugans, not audio.

One unit must be set to be the master and the others slaves:

1. Designate one unit as the master by setting the **NORM–SLAVE** switch on the back panel to **NORM** (up).

2. Designate any other units as slaves by setting their **NORM–SLAVE** switches on the back panel to **SLAVE** (down).

3. Use ADAT (Toslink) cables to link units in a ring network (see below).

   Note that all **LINK IN** and **OUT** connectors are used to create the ring.
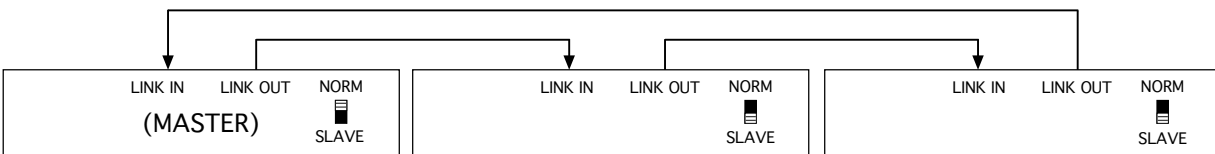
Figure 3-5 Linking multiple Dugans

Chapter 4: Installation

Rack Mounting

One or two half-rack-sized Dugan controllers can be mounted in a single rack space. Each unit ships with one long and one short rack ear and one joining plate. Two units provide the necessary parts for mounting side-by-side.

The rack ears for older half-rack Dugans differ slightly from the current design, but the joining plates are the same. Any pair of half-rack-sized Dugans can be mounted side-by-side using the appropriate rack ear for each unit.

To rack-mount a single unit, attach one long and one short rack ear, then mount in the rack.

To mount two units side-by-side:

1. For the left unit, remove the four screws from the right side of the top and bottom lids.
2. Attach the top and bottom joining plates to the left unit.
3. For the right unit, remove the four screws from the left side of the top and bottom lids.
4. Attach the top and bottom joining plates to the right unit.
5. Attach the appropriate short rack ears to the left and right units.

Back Panel Connectors and Switches

Model E-3A channels are patched as inserts to your console's input channels. Where they are inserted depends on whether you are using the Dugan Speech System (see page 12), the Dugan Music System (see page 14), or both.

NOTE: *When an actor both sings and speaks, it is best to route the same mic through two Dugan channels (one for the Music and one for the Speech System) and switch between them. See Musical Theater on page 62 for more information.*

The Model E-3A provides the following connectors:

- **AES 1–8, AES 9–16**

  These two DB-25 connectors each carry eight balanced AES I/O channels, and are wired with the Tascam pinout (see Appendix A: *Connector Pinouts*).

  When the unit is powered off, bypass relays connect all AES input pairs to their respective output pairs. This lets you turn off the unit while allowing AES through-put without unpatching.

- **AUD IN/OUT 1–8**

  These ADAT connectors carry eight channels of audio I/O.

- **LINK IN/OUT or AUD IN/OUT 9–16**

  These ADAT connectors carry proprietary linking data. They can also be re-assigned as eight additional audio channels.

- **WORD CLOCK IN, WORD CLOCK OUT**

  These carry word clock signals in and out.

- **10/100BASE-T**

  Three Ethernet connectors (one accepts PoE). For your convenience, these connect to an internal network switch.

- **Power**

  Locking coaxial connector accepts 12–24 VDC.

Figure 4-1 Model E-3A back panel I/O connectors

Model E-3A Modes

The Model E-3A has a mode switch that controls whether to use AES or ADAT as your primary I/O. When set to AES mode however, the AES and ADAT channels can operate simultaneously. This can yield up to 32 automix channels. In ADAT mode, AES channels will not appear in the Dugan Control Panel.

NOTE: *Unprocessed splits of the input signals are always present on the outputs of the unused I/O connectors. These can be sent to a multitrack recorder.*

Select only the number of channels you need for automixing. This will simplify the Dugan Control Panel display, maximize your I/O, and retain flexibility to manage your other requirements, such as mirroring inputs to outputs, linking, and mix buses.

NOTE: *It is not necessary to select channels here that you plan to use for mix bus outputs.*

AES Mode

You can choose:

- 8 channels (1–8)
- any number of additional AES channels up to 16

Sixteen additional automix channels are available using the ADAT I/O:

- 8 channels using ADAT I/O (**AUD IN 1–8**) for a total of 24
- 8 channels using ADAT I/O (**AUD IN 9–16**) for a total of 32

To choose the number of automix channels:

1. Navigate to **MENU** on the front panel, and press **ENTER**.
2. Select **Channels Setup** and press **ENTER**.
3. Navigate to **AES Channels**, turn the knob to select one of the following: **8, 9...16**.
4. If you need more channels, continue to turn the knob to add 8 or 16 ADAT channels.
5. When you navigate away from this screen, you will be prompted to confirm your setting.

In the tables below:

- √: shows active I/O routes
- **M**: AES inputs are mirrored to the ADAT outputs, or vice versa
- Blank cell: channels are inactive

Table 4-1 Back panel switch set to AES

Channels	AES I/O		ADAT I/O		Linking
	1–8	9–16	1–8	9–16	
8 AES	√		M		√
9–16 AES Linking enabled*	√	√	M		√
9–16 AES Linking disabled*	√	√	M	M	
1–16 AES + 8 ADAT	√	√	√		√
1–16 AES + 16 ADAT	√	√	√	√	

＊ On the front panel **Channels Setup** screen, select **Disable Linking** to free up ADAT outputs 9–16 for AES input mirroring.

ADAT Mode

You can choose 8 or 16 channels of automixing using ADAT connectors.

The table below shows how the inputs and outputs can be allocated by selecting the number of channels on the **Channels Setup** screen.

Table 4-2 Back panel switch set to ADAT

Channels	ADAT I/O		AES I/O		Linking
	1–8	9–16	1–8	9–16	
8	√		M		√
16	√	√	M	M	

Linking

Up to eight Dugan units can be linked into a single automatic mixing system. All digital Dugan models can be linked in any combination. The audio I/O for each must be configured and connected individually. Linking passes only control information between Dugans, not audio.

To configure the Dugan for linking:

1. In the Master Pane of the Dugan Control Panel, click the **ADAT** button.

    It toggles between **8** and **16**.

    You can also do this from the front panel's **MENU > Channels Setup** screen.

2. Set **ADAT** to **8**.

3. Power down the Dugan(s).

4. Designate one unit as the master by setting the **NORM–SLAVE** switch on the back panel to **NORM** (up).

5. Designate any other units as slaves by setting their **NORM–SLAVE** switches on the back panel to **SLAVE** (down).

6. Use ADAT (TOSLINK) cables to link units in a ring network.

    In the figure below note that all **LINK IN** and **LINK OUT** connectors are used to create the ring.

7. When the connections are complete and the switches are set, power on the Dugans.
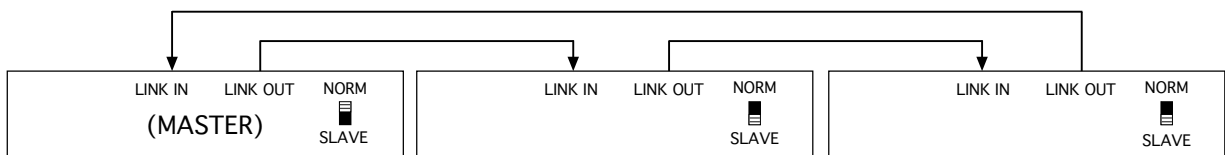
Figure 4-2 Linking Dugan units

Word Clock

By default, word clock is derived from the active AES or ADAT input. However, if a word clock signal is sent to **WORD CLOCK IN**, the Model E-3A will use that as its word clock source. In all cases, the selected word clock is sent to **WORD CLOCK OUT**.

NOTE: *All mute LEDs flash together if there is no valid clock source. This typically means the unit has no digital signal at the inputs.*

To check or change the word clock source:

1. Use the front panel to go to **MENU**.

2. Select **Channels Setup.**

3. Navigate to the right to the field under **Sync**.

4. Rotate the knob to select the desired source.

WORD CLOCK IN is unterminated when shipped. If you are receiving word clock over a very long cable (> 20 ft), remove the top lid and move the switch to **ON** (see below).
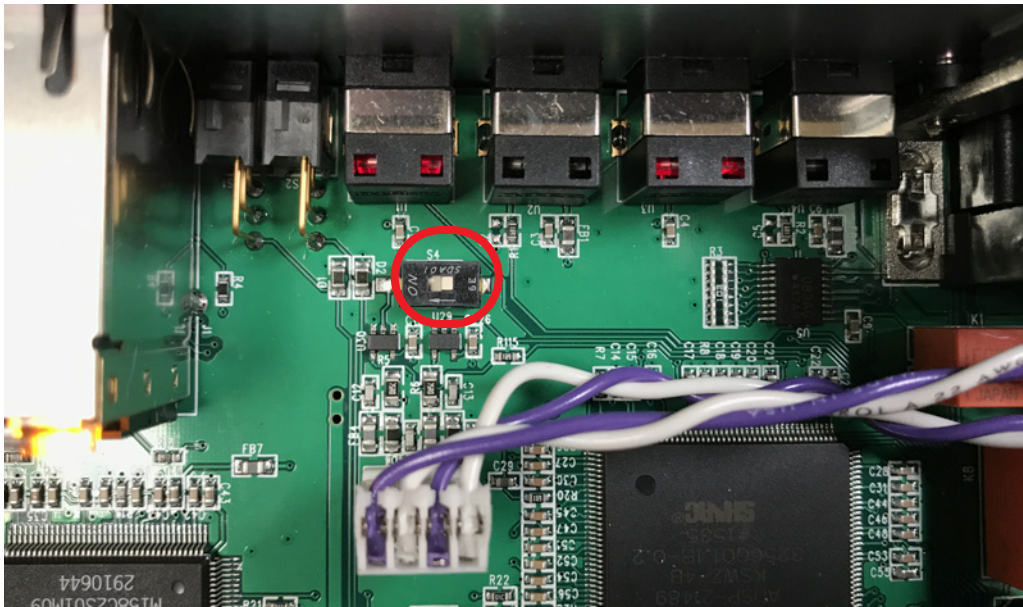
Figure 4-3 Word clock input termination switch

Power

A power connector accepts a locking power cable. In an emergency, the Model E-3A can accept power supplies within the range 12–24 VDC, 2 A (minimum), center pin positive.

Mix Matrix Outputs

An internal mix matrix can route processed or unprocessed inputs to six mix buses that can be assigned to any audio outputs.

For more information on using mix buses, see *Mix Buses* on page 49.

Chapter 5: Connecting to a Computer

There are two ways to connect the Model E-3A to your computer so you can use the Dugan Control Panel:

- to your computer via a local area network (LAN).

  If you are already connected to a LAN, we recommend using it.

  - OR -

- directly to your computer with a single cable.

In either case you will need these two Java applets located on the thumb drive shipped with the Model E-3A:

- The Dugan Utility helps you set an IP address.

  It is also used to update the firmware (see Chapter 10: *Updates*).

- The Dugan Control Panel offers convenient monitoring and operational capabilities.

If you do not have the thumb drive, download the latest files from:

http://www.dandugan.com/downloads

iPad *Use a computer to complete your connection before using the iPad app.*

Connecting to a Network

To connect directly to a computer with a single cable, proceed to page 30.
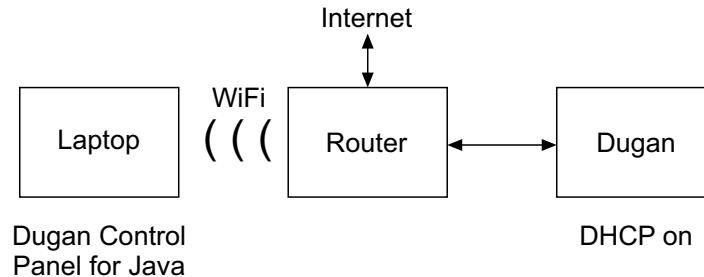
Figure 5-1 Connecting to a LAN

1. Connect an Ethernet cable from one of the **10-100-1000 BASE-T** jacks to your router.

2. Windows users must turn the Windows firewall off.

   The Windows Firewall blocks port 9776 used by the Dugan software to communicate. If you must leave the Windows firewall on, open this port.

3. Launch **Dugan-Utility-***yyyymmdd***.jar**.

   The Dugan Utility dialog appears.
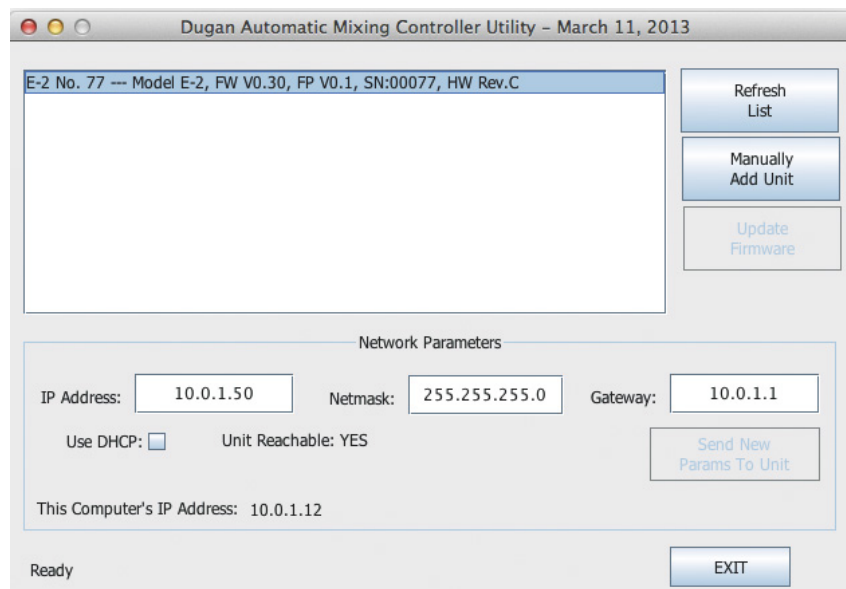
Figure 5-2 Dugan Utility

If the Dugan Utility does not launch, install the latest version of Java from: http://www.java.com/en/

This link locates you to obtain the necessary Java Runtime Environment. If you are offered the Java Development Kit, you are in the wrong place.

4. Wait 60 seconds and if the list pane is blank, click **Refresh List**.

    If the list pane remains blank, proceed to *Manually Add Unit* below.

    If the list pane displays Dugan units, continue.

5. Click on the first unit in the list so it is highlighted.

    The Network Parameters section displays information about that unit.

    If you see **Unit Reachable: YES**, you are ready to use the Dugan Control Panel with that unit. If you have additional Dugan units to connect, select the next unit in the list and repeat this step. If you are finished with installation, proceed to Chapter 6: *Dugan Control Panel Software*.

    If you see **Unit Reachable: NO**, proceed to the next step.

6. Select the **Use DHCP** parameter.

7. Click **Send New Params to Unit**.

    The Model E-3A will reboot.

8. Click **Refresh List**.

9. Highlight the unit in the list pane again.

    If you see **Unit Reachable: YES**, this unit is ready to use with the Dugan Control Panel. If you have additional Dugan units to connect, select the next unit in the list and repeat Step 5. If you are finished with installation, proceed to Chapter 6: *Dugan Control Panel Software*.

    If you see **Unit Reachable: NO**, proceed to the next step.

10. De-select the **Use DHCP** parameter.

11. Match the first three groups of the IP Address with the computer, and assign your own number to the last group.

    This number *must not* have been assigned to another device in this network. You may need to consult with the administrator of the network to determine this.

12. Click **Send New Params to Unit**.

    The Model E-3A will reboot.

13. Click **Refresh List**.

14. Highlight the unit in the list pane again.

    If you see **Unit Reachable: YES**, this unit is ready to use with the Dugan Control Panel. If you have additional Dugan units to connect, select the next unit in the list and repeat Step 5. If you are finished with installation, proceed to Chapter 6: *Dugan Control Panel Software*.

Connecting to a Computer Directly

To connect to a network, go back to page 28.
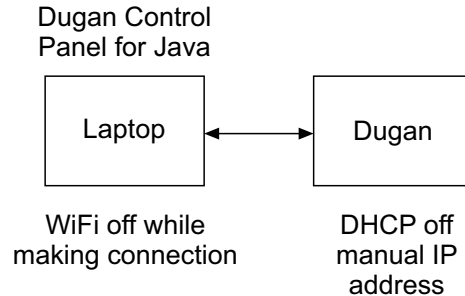
Figure 5-3 Connecting directly to a computer

To connect the Model E-3A directly to a computer:

1. Connect an Ethernet cable from one of the **10-100-1000 BASE-T** jacks to your computer.

   An older PC may require a crossover cable.

2. Windows users must turn the Windows firewall off.

   The Windows Firewall blocks port 9776 used by the Dugan software to communicate. If you must leave the Windows firewall on, open this port.

3. Turn off the computer's WiFi during this process because it often interferes.

   You can turn it back on after the connection has been established.

4. Launch **Dugan-Utility-***yyyymmdd***.jar**.

5. If the Dugan Utility does not launch, install the latest version of Java from:

   http://www.java.com/en/

   This link locates you to obtain the necessary Java Runtime Environment. If you are offered the Java Development Kit, you are in the wrong place.

Figure 5-4 Dugan Utility

6. Wait 60 seconds and if the list pane is blank, click **Refresh List**.

If the list pane remains blank, proceed to *Manually Add Unit* below.

If the list pane displays Dugan units, continue.

7. Click on the first unit in the list so it is highlighted.

The Network Parameters section displays information about that unit.

If you see **Unit Reachable: YES**, you are ready to use the Dugan Control Panel with that unit. If you have additional Dugan units to connect, select the next unit in the list and repeat this step. If you are finished with installation, proceed to Chapter 6: *Dugan Control Panel Software*.

If you see **Unit Reachable: NO**, proceed to the next step.

8. De-select the **Use DHCP** parameter.

9. Match the first three groups of the IP Address with the computer, and assign your own number to the last group.

10. Click **Send New Params to Unit**.

The Model E-3A will reboot.

11. Click **Refresh List**.

12. Highlight the unit in the list pane again.

If you see **Unit Reachable: YES**, this unit is ready to use with the Dugan Control Panel. If you have additional Dugan units to connect, select the next unit in the list and repeat Step 7. If you are finished with installation, proceed to Chapter 6: *Dugan Control Panel Software*.

Manually Add Unit

A router may be configured to reject broadcast packets, in which case the unit will not appear in the Dugan Utility list pane. You can manually add the unit, but you must first find its IP address.

To determine the IP address:

1. On the front panel, select **MENU** by pressing the up then left navigation arrows.

2. Press **ENTER**.

    The **MENU** screen appears.

3. Select **Network Setup** by pressing the down then right navigation arrows.

4. Press **ENTER**.

    The **Network Setup** screen appears.

5. Check that the **IP Address** is in the same subnet as the computer (first three groups are the same).

    If it is in the same subnet, note the IP Address and proceed to step 1 below.

    If it is not in the same subnet, continue.

6. Deactivate the **DHCP** button.

7. Match the first three groups of the IP Address with the computer, and assign your own number to the last group.

    This number *must not* have been assigned to another device in this network. You may need to consult with the administrator of the network to determine this.

To manually add the unit:

1. In the Dugan Utility, click **Manually Add Unit**.

2. Enter the IP address from the Front Panel's **Network Setup** screen.

3. Click **OK** to exit the dialog.

4. Click **Refresh List**.

5. Select the unit you added.

    You should see **Unit Reachable: YES**.

Setting a Specific IP Address

Users with network expertise can set a specific IP address for any Dugan unit on the network. Operating the real-time Dugan Control Panel requires that the Dugan unit and computer be on the same subnet.
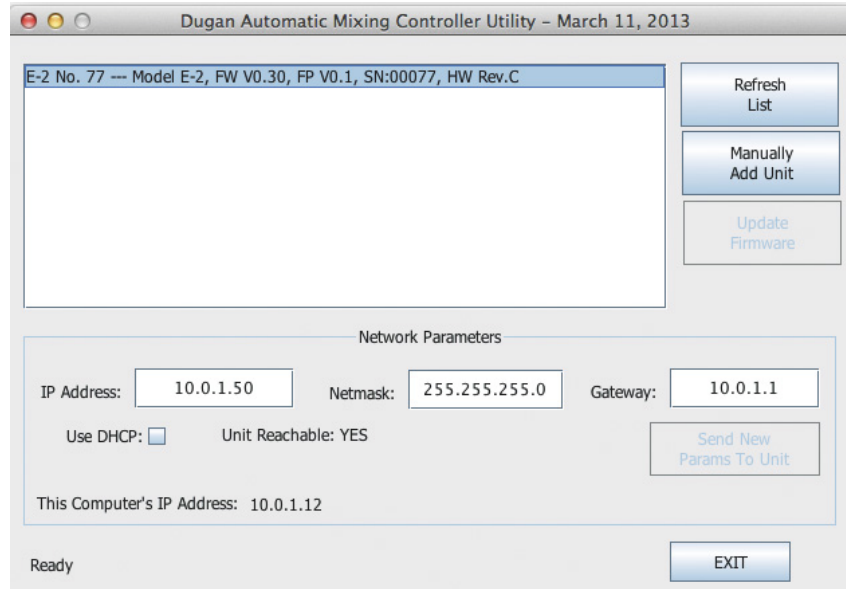
1. Launch **Dugan-Utility-***yyyymmdd***.jar**.
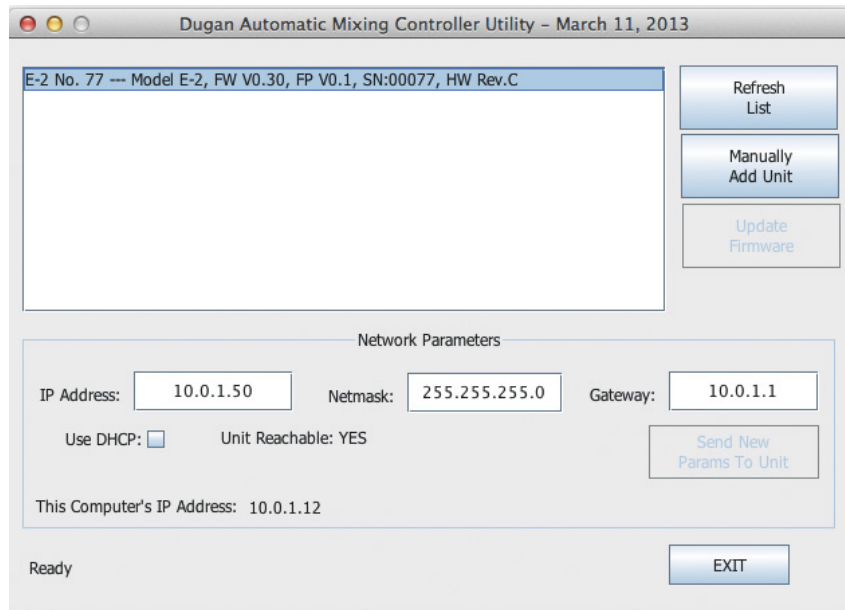
Figure 5-5 Dugan Utility

2. Wait 60 seconds and if the list pane is blank, click **Refresh List**.

   If the list pane remains blank, skip back to *Manually Add Unit* above.

   If the list pane displays Dugan units, continue.

3. Click on the first unit in the list so it is highlighted.

   The Network Parameters section displays information about that unit.

4. If **Use DHCP** is selected, de-select it.

5. Enter the desired IP address into the **IP Address** field.

6. Click **Send New Params to Unit**.

   The Model E-3A will reboot.

7. Click **Refresh List** to confirm the settings.

8. Repeat from step 3 to set IP addresses for additional units.

Chapter 6: Dugan Control Panel Software

The Dugan Control Panel software has both Java and iPad versions. This chapter discusses the Java version. The few differences in the iPad app are noted.

NOTE: *After configuring the unit with the Dugan Control Panel, it can be disconnected if you do not wish to use it. All settings are retained, except on power up the Preset function is invoked (see page 41).*

Figure 6-1 Dugan Control Panel

Launch the **Dugan-Control-Panel-**vxxx**.jar**. If this file is not available and you have an Internet connection, you can obtain the latest version from:

http://www.dandugan.com/downloads

The Dugan Control Panel has three panes. The controls displayed in these panes depend on which Dugan device is selected in the Top Pane.

Top Pane	Icons for all connected Dugan units
Channel Pane	Controls for individual channels
Master Pane	Controls for groups a, b, and c

Top Pane

The Top Pane displays all connected Dugan units. The selected block is enclosed by a yellow rectangle. These channels are shown in the Channel Pane. Clicking on another block selects it and deselects the previous block.

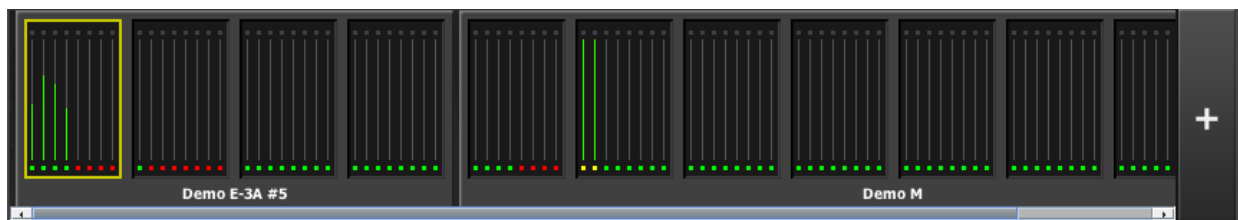*NOTE:*   *The last block of a unit may have fewer than eight channels.*

Figure 6-2 Top Pane

If all connected units do not appear in the Top Pane, see *Establishing Network Connections*. If the Top Pane is full, a thin scroll bar appears along the bottom.

To display a unit's IP address, hover the mouse over the unit's name.

---

iPad   *To display a unit's IP address, touch and hold the unit's name.*

Adding Units Manually

To add a unit with a known IP address manually, click the **+** sign at the right of the Top Pane and enter the IP address in the dialog that appears.

To display a unit's IP address, hover the mouse over the unit's name.

Setting Controls

Controls can be adjusted five ways:

- Enter a dB value in the numeric field.
- Drag in the numeric field (not on iPad).

When a slider is present:

- Drag the slider up or down.
- Click in the slider track to raise or lower the value by 0.5 dB.
- Ctrl-click anywhere on the slider to reset its value to 0 (on iPad, touch and hold).

Naming Units and Channels

Connected units are displayed in the top pane in alphabetical order. If you wish to display them in your own order, use numerical prefixes. Assigned names will appear in the Dugan software.

To name a unit and its channels:

1. Select a unit in the Top Pane.
2. Select the yellow text in the Master Pane (under the Dugan logo) and type a name.
3. Press the Enter key on the keyboard to set the name.
4. To name a channel, select the yellow text and type a name.
5. Press the Enter key on the keyboard to set the name.

Channel naming can be cleared by recalling **Factory Defaults** scene (see *Scenes Panel* on page 52). The unit name is reset by selecting **Factory Reset** on the front panel **MENU** screen or **Factory Defaults** on the **Network Setup** screen.

Channel Pane

The Channel Pane contains all channels in the selected block of the Top Pane (high-lighted with the yellow rectangle). If your screen is wider, you can display more channels by stretching from the right margin. Otherwise, you can use the scroll bar at the bottom to see additional channels, or select a different block in the Top Pane.

Channels are either in **bypass** or one of three operating modes: **man, auto**, or **mute**. The active channel mode illuminates. Select a channel mode by pressing the individual mode buttons or the Master **PRESET** button. All mode transitions are made with a smooth, rapid fade.

Figure 6-3 shows a typical system: channels 1–4 in **auto** with ambient noise, and channels 5–8 in **mute**.

Figure 6-3 Channel Pane

Level Indicator

Each channel has a **level** LED that lights green when the audio level is adequate for automatic mixing. It should remain green when no one is talking.

- If the **level** indicator blinks, raise the console's channel input gain.

    If the channel input gain is already set to its maximum, raise all the **weight** controls an equal amount (e.g., from 0 to +5).

- If the **level** LED lights red, lower the console's channel input gain.

Bypass

When **bypass** is active, the signal passes through without automixing. A bypassed channel appears inactive, with all lights extinguished.
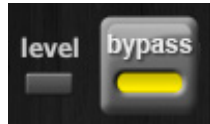
Figure 6-4 bypass button active

Man and **bypass** modes are similar:

- **bypass** makes an instantaneous transition, which can cause an audible click.
- **man** performs a quick fade without sonic artifacts.

To deactivate **bypass**, you can:

- Click **bypass** again;

    - *OR* -

- Click any of the three channel mode buttons.

Channel Modes

There are three channel modes: **man, auto**, and **mute**. Changing modes initiates a half-second fade to the new mode. Like radio buttons, you can only choose one mode at a time.

Figure 6-5 Channel modes

Man

In **man** mode there is no automixing, and the signal passes through at unity gain.

Even though **man** and **bypass** modes perform similar functions, we recommend using **man** during live mixing to prevent clicks.

Auto

This is the normal Dugan automixing mode.

Mute

The channel is muted when **mute** is active.

NOTE: *To find a channel causing unwanted noise in the mix, scan the gain displays to locate it and activate its **mute** button.*

Preset

Use the Preset function to store your favorite channel mode settings, which may be restored by pressing the Master **PRESET** button. When the unit powers up, the channels default to their preset modes.

To set channel presets:

> **1.** Click the channel **preset** button next to the desired channel mode button.
>
> **2.** For all unused channels, click the **preset** button next to the **mute** button.

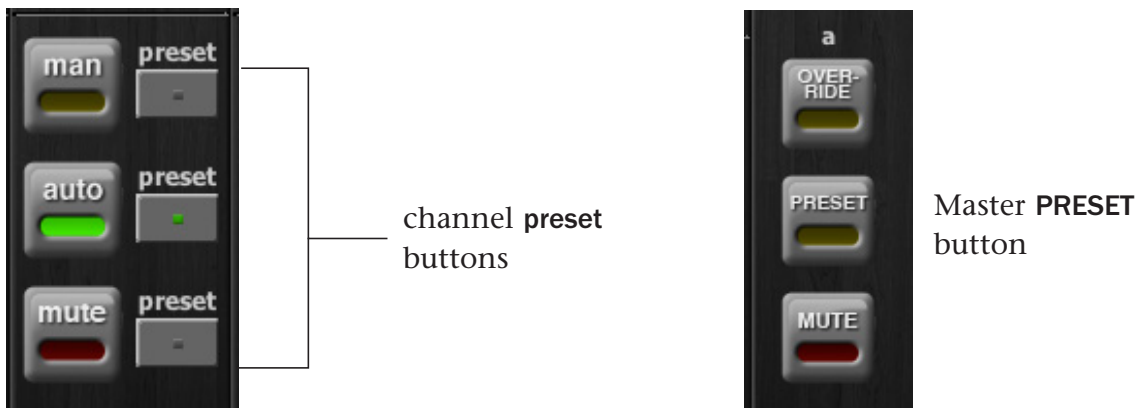**Figure 6-6** Channel **preset** (left) and Master **PRESET** (right) buttons

The preset indicators should mirror your normal working combination of input modes. The normal condition can then be restored by pressing the Master **PRESET** button.

Channel Groups

Each channel can be assigned to one group: a, b, or c. Each group functions as a separate, independent automatic mixer that can span multiple linked Dugans. Channels assigned to groups need not be contiguous.

Applications where groups are helpful include:

- Separate Rooms: Assign the mics in each room to different groups so they function as separate automatic mixers.
- Stereo Panning: Assign the mics panned left, right, and center to groups a, b, and c, respectively, to maintain a stable stereo ambience.

To assign a channel to a group, click the **group** button until the desired group letter appears. The channel strip background is tinted green (**group b**) or blue (**group c**); **group a** is not tinted (Figure 6-7). A set of **OVERRIDE**, **PRESET**, and **MUTE** buttons appears in the Master Pane for each group.

Figure 6-7 Channels in three groups

Override

Override can be used to instantly mute all mics except one (the host or chairperson). However, any number of mics can be included in the override group. It can thus be used to make a dramatic A/B comparison between automatic and conventional mixing.

To assign channels to an override group, activate the **override** button on each channel.

Pressing the Master section **OVERRIDE** button puts channels with their **override** buttons lit into **man** mode. All other channels are muted. Press the **OVERRIDE** button again to restore normal automixing operation.

Meters

The meters have three display modes. The default mode is **auto mix gain**, which is the most useful display during normal operation. The input and output meters are only used when setting or checking levels.

Table 6-1 Meter modes

	Meter Displays	Meter Color
auto mix gain	action of the Dugan Speech System	green
input	input level	yellow
output	output level	blue

Click on the Master **meters** button to cycle through the three meter display modes.

Weight Controls

The **weight** controls set the side-chain levels for each channel into the control system. This establishes the relative sensitivity of the automatic mix for the channels in use. The **weight** controls do not change the mix levels. When weights are balanced, each mic has an equal opportunity to take over the system.
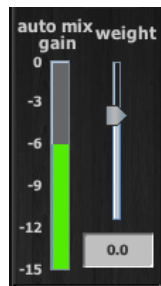
Figure 6-8 Weight controls

The **weight** controls should be used to balance the channel **auto mix gain** indicators when no one is talking. If a console preamp trimmer is turned down, that channel's **weight** control can be turned up to re-balance the automixing, and vice-versa.

To adjust the weight setting, click and drag the **weight** slider or enter a number in the numeric field.

NOTE: *Ctrl-click the weight slider to reset it to 0.*

---

iPad   *Touch and hold the **weight** slider to reset its value to 0.*

It is important to understand that **weight** does not set that mic's level in the mix when that person speaks, but only its sensitivity in activating automatic mixing. The Speech System detects the ratios of the levels between channels, not their absolute levels. The **weight** control is not a gate threshold!

The following example illustrates how **weight** affects **auto mix gain** (see Figure 6-9).

Raising the **weight** control for one channel:

- increases that channel's **auto mix gain** display during ambience and decreases it slightly for the others;
- makes it more difficult for others to speak when someone speaks into the channel with the higher **weight** setting.
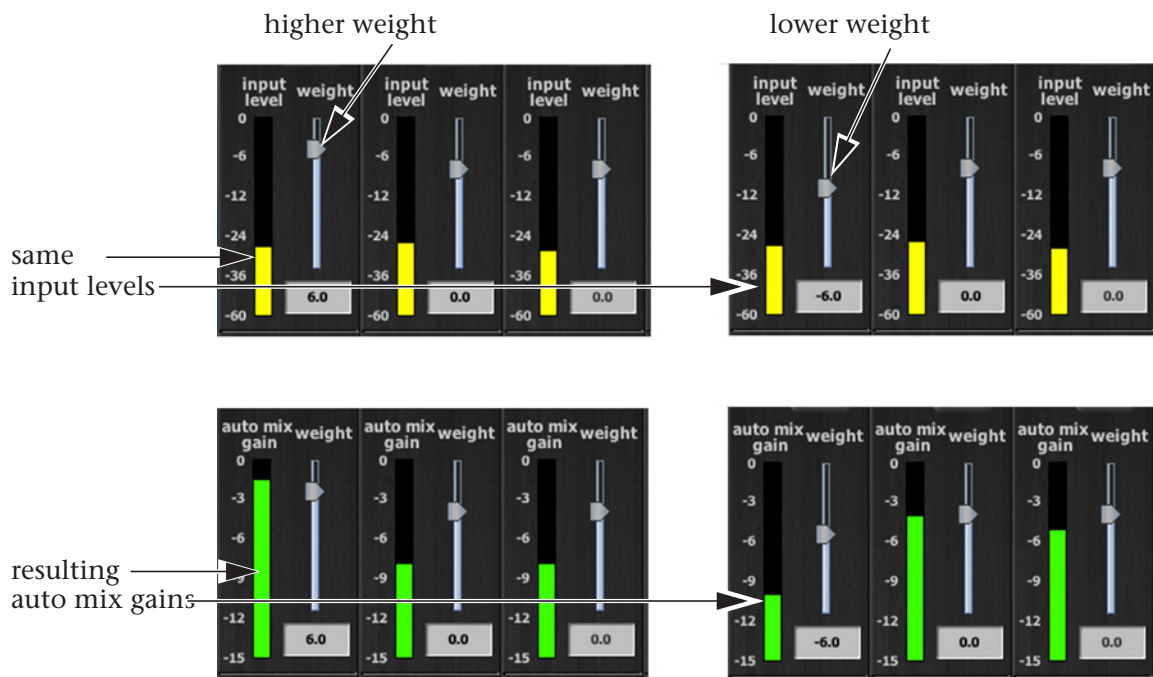
Figure 6-9 How changing one channel's weight control during ambience affects the auto mix gains

Lowering the **weight** control for one channel:

- decreases the **auto mix gain** display during ambience for that channel and increases it slightly for the others;
- makes it more difficult for that channel's talker to be heard over the others.

For optimal performance, balance the **weight** controls so the channel gains display approximately equally when no one is talking.

Figure 6-10 shows eight- and four-mic systems with appropriate **auto mix gain** displays when no one is talking.
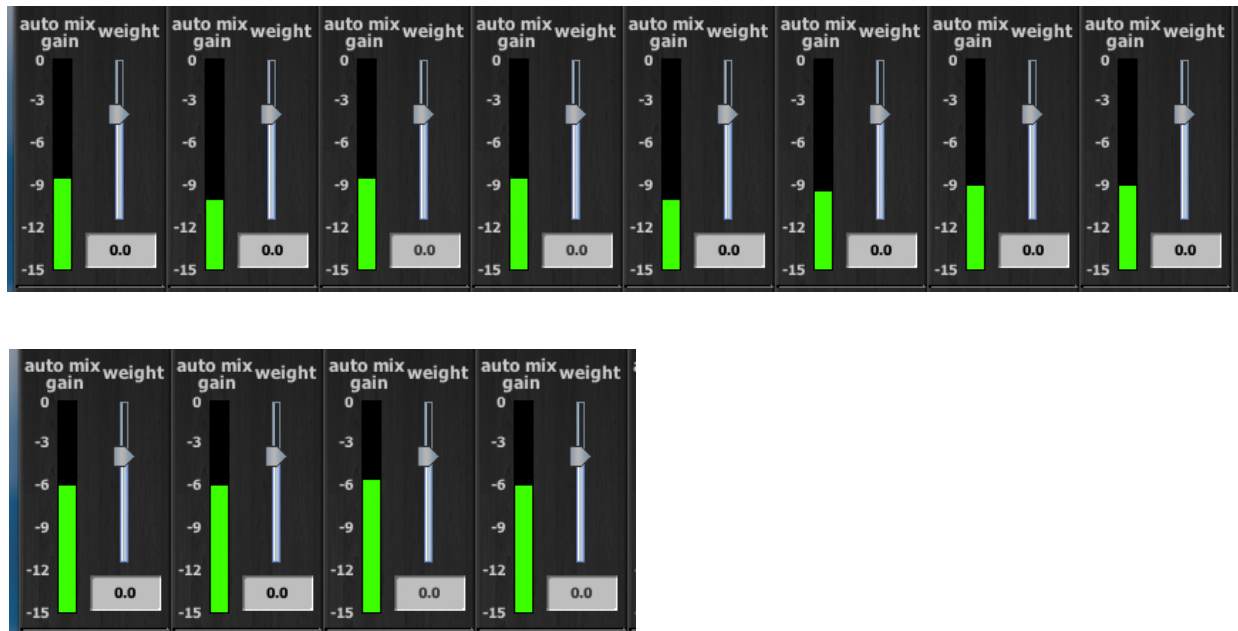
Figure 6-10 Multiple mic ambience: **auto mix gain** hovers around -9 dB for eight mics, -6 dB for four mics

You can perform the following functions using the **weight** controls:

- If there is ongoing noise near one mic (e.g., computer fan or air vent), suppress it by reducing that channel's **weight.** Of course, you will hear that noise increase when that talker speaks.

- To allow the chairperson to override interruptions, set his/her **weight** higher than the other channels. If you set the chairperson's weight too high, quiet speech from the other channels may be lost.

- To duck all mics when another sound source is playing, use a dummy input, that does not get routed to a mix bus.

Master Pane

The content of the Master Pane changes to reflect the Dugan device selected. In the figure below, the selected device is a Model E-3A.

The following information is displayed below the Dugan logo:

- the selected unit's firmware
- the currently running Control Panel (CP-J) software
- the unit's name appears in yellow and is editable

This section documents the Master Pane's controls and indicators.

Figure 6-11 Master Pane with one group

The Master indicators are shown in Figure 6-11:

- **online:** Lights when a unit is connected to the Dugan Control Panel
- **AES-ADAT, NORM-SLAVE:** Displays their back panel switch settings
- **48k lock/96k lock:** Indicates a valid word clock source

The Master controls are also shown in Figure 6-11 and are discussed below. A set of **OVERRIDE**, **PRESET**, and **MUTE** buttons appears for each active group.

Reset

Before making a new setup, we recommend clicking **reset** to set all operating controls to default values. This does not include network parameters or the unit's name.

Meters

The meters have three display modes. The default mode is **auto mix gain**, which is the most useful display during normal operation. The input and output meters are only used when setting or checking levels.

Table 6-2 Meter modes

	Meter Displays	Meter Color
auto mix gain	**action of the Dugan Speech System**	green
input	input level	yellow
output	output level	blue

Click on the Master **meters** button to cycle through the three meter display modes.

Clock Source

The **clock source** button displays the currently assigned source which determines the sample rate.

Click on **clock source** to override the automatically assigned clock source to select your own: **ADAT, Automatic, Word Clock, AES Inputs (AES 1-2...AES 15-16)**, and **Internal** (for testing only).

In **Automatic**, if a word clock input is detected, it is automatically selected over any other clock source.

NOTE: *If there is no valid clock source, all mute LEDs flash together, which usually means the unit has no digital input signal.*

System

It is possible to have multiple systems on your network. For example, some facilities may wish to have one network serve separate studios. It is not desirable for these systems to interact or be viewed when using a different studio. The Model E-3A allows you to create up to 16 separate systems on one network.

Separating Systems

To separate multiple systems:

1. Select the first unit to include in the system by clicking it in the Top Pane.
2. Click the **system** button and select a unique number for that system.
3. Repeat for each unit in that physically linked system, making sure to use the same number for each unit in the system.
4. Repeat steps 1–3 for each system.
5. To query which system a unit belongs to, select it in the Top Pane and view its number on the **system** button.

Selecting Units to Display

After dividing units into separate systems, you may want to restrict the units shown in the Top Pane to those in your studio. To do this:

1. Hover the mouse cursor over the names of the units that you want to display, and note their IP addresses.
2. Ctrl-click on the **+** sign at the right of the Top Pane.

    The **+** sign turns red.
3. Quit and relaunch the Dugan Control Panel.

    It opens with **Auto Detect Disabled** in the Top Pane
4. Click on the red **+** sign, and enter the IP address of the first unit you want to add.
5. Repeat step 4 until your units all appear in the Top Pane.

Manually added units must also be removed manually. To remove manually added units from the Top Pane, shift-click on the **+** sign. A dialog appears to confirm that they have been removed.

To restore automatic detection, Ctrl-click on the **+** sign, which turns white.

Mix Buses

Click the **mix bus** button to open the mix bus matrix screen. Figure 6-12 shows the **mix bus masters** in the upper pane, and the **mix bus matrix** in the lower pane.

Each mix bus can be sent to any output or used internally as a Music System Threshold Input.
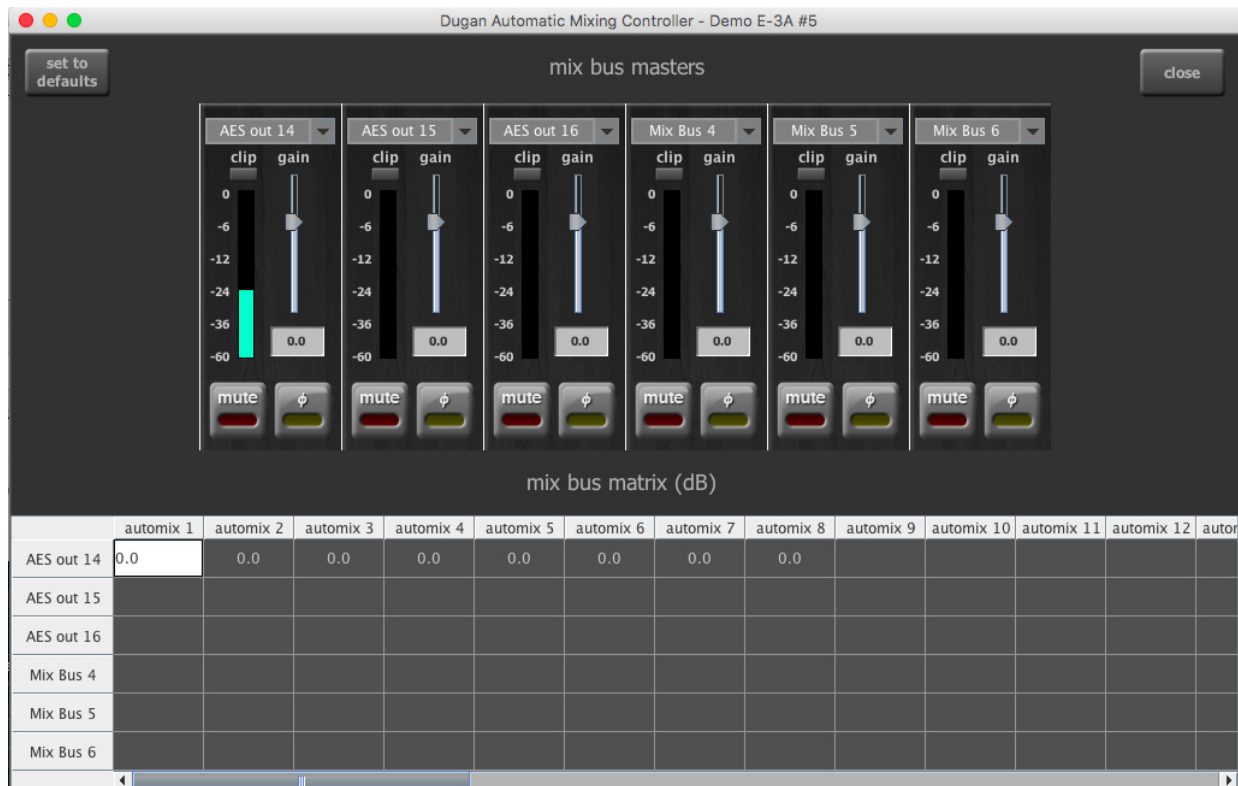
Figure 6-12 Mix bus matrix screen in Dugan Control Panel

Mix Bus Masters

To choose the destination of each mix bus, click on the menu at the top of each mix bus master:

- All AES and ADAT outputs are available.

  Assigning an output to a mix bus disconnects it from its previous channel output assignment.

  To rename the output, click in the name field (not the arrow).

- **Mix Bus 1–6**: makes that mix bus available internally to the Music System Threshold Inputs.

The six **mix bus masters** adjust the gains of the mixes, and the level meters show the output levels. You can mute outputs and reverse their polarity.

NOTE: *Ctrl-click the **mix bus masters** fader to reset it to 0.*

---

iPad   *Touch and hold the **gain** slider to reset its value to 0.*

Mix Bus Matrix

The signals available as inputs to the **mix bus matrix** include all Dugan-processed channel outputs and all AES and ADAT inputs. To see all available processed and un-processed input signals to the **mix bus matrix**, scroll left or right.

To set the gain for a **mix bus matrix** crosspoint, enter values (-96 to 0 dB) in the desired matrix cells.

- To erase all previous routing, click the **set to defaults** button (at top-left).

   This sets all crosspoints to -96 dB.

- To set a crosspoint to unity gain, enter 0.

- To attenuate a crosspoint, enter the desired dB value.

- To remove a crosspoint, delete its contents.

Blank crosspoints are set to -96 dB (off).

Group Master Controls

The Master Pane displays a set of group master control buttons for each group in use.

Override

Activating the Master **OVERRIDE** button has the following effect on individual channels:

- Channel **override** button active: puts the channel in **man** mode with full gain (no automixing);

  - *OR* -

- Channel **override** button inactive: mutes the channel.

De-activating the Master **OVERRIDE** button returns the channels to normal operation.

Select channel(s) to include in the override group by activating their **override** button(s).

Remove channel(s) from the override group by deactivating their **override** button(s).

Preset

Clicking the Master **PRESET** button sets the channel modes (**man, auto, mute**) to those shown on each channel's **preset** buttons. Use these settings to store your favorite channel mode settings. When the unit powers up, the channels default to their preset modes.

Mute

Click the **MUTE** button to mute a group. Click it again to unmute the group.

Master Panels

One of three panels can overlay the Master Pane. Click a tab on the right margin to open a panel, click its **CLOSE** tab when finished.

| iPad | *Swipe a Master Panel right to close it.* |

Music System Panel

See Chapter 8: *Dugan Music System and Gain Limiting* for a complete discussion of the Music System and its controls.

Model K Devices Panel

The Model K Devices panel (Figure 6-13 left) lets you pair this instance of the Dugan Control Panel with a Model K Control Surface. When they are paired, selecting a block of eight channels on one also selects it on the other.

Figure 6-13 Model K panel (left); Scenes panel (right)

Scenes Panel

The Scenes panel (Figure 6-13 right) lets you create, recall, save, rename, and delete scenes. Scenes include all Model E-3A parameters except the network setups and the name of the unit.

The current scene name appears at the top of the Scenes panel. A * at the end of the name indicates the scene has been edited.

Select **Global** to record scenes for all connected units. Deselect **Global** to restrict scene save and recall to the current unit.

The **Factory Defaults** scene cannot be modified. If you make changes with **Factory Defaults** as the active scene, click **New** to save the current state of the unit under a different name.

---

*NOTE: You cannot **Save** or **Delete** the Factory Defaults scene.*

To create a new scene:

    1. Click the **New** button.

       The scene name dialog appears with an automatically generated name highlighted.

    2. If desired, type a new name then press **Enter**.

To recall a scene:

    1. Select a scene from the list.

    2. Click the **Recall** button.

To save changes to the current scene, click the **Save** button.

To delete a scene:

    1. Select a scene from the list.

    2. Click the **Delete** button.

To rename a scene:

    1. Double-click the scene name.

    2. Type a new name then press **Enter**.

Chapter 7: Pre-fader Insert

The Dugan Speech System works either pre- or post-fader, but it is more convenient to operate post-fader. If your console allows a post-fader insert, skip this chapter.

Workaround to Create Post-fader Insert

If your console has post-fader direct outputs and enough extra inputs, you can create post-fader inserts (see figure below).
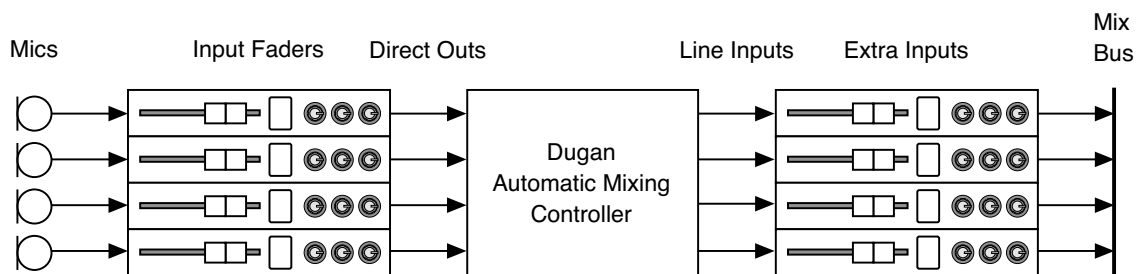
Figure 7-1 Workaround using direct outs and extra inputs to create a post-fader insert

Use the Input Faders for mixing and leave the Extra Inputs (returns) at unity gain. Hide the Extra Input faders if your console has layers.

Pre-fader Insert

If you must use a pre-fader insert, this section describes how to properly mute and pre-listen to muted channels.

Muting Channels

Mics must be muted by using the **mute** buttons on the Dugan Control Panel. Pulling a fader down on the console will not properly mute a pre-fader channel. Although that mic is no longer audible in the mix, it still contributes to the gain computations and causes ambient noise fluctuation. In the worst case, this could cut off a speaker.

To properly mute a channel with the console faders up, adjust levels while people are talking. Mute a mic by clicking the channel **mute** button on the Dugan Control Panel. Enable the mic by activating the **auto** button.

Muting mics does not alter the overall ambient sound mix: the Speech System raises the ambient gains of the other mics to compensate for the gain subtracted by muting a mic. This occurs during ambience without input to any mic. When one or more mics receive speech input, the gain shifts to the active mics.

Pre-listening to Muted Channels

If your console allows listening to a mic before the insert point, you can mute on the Dugan.

If signal through the Dugan is required to pre-listen to a mic, pull the fader down and put the channel in **bypass** mode. When your mic check is done, switch the channel back to **auto** mode, and raise the fader so the Dugan can cue in the mic.

Chapter 8: Dugan Music System and Gain Limiting

Dugan Gain Limiting is typically used with the Dugan Music System. To learn more about these concepts, see Chapter 2: *Theory of the Speech and Music Systems*.

Dugan Music System

The Dugan Music System is a ducker with its threshold set by the level of an audio side chain (the Music System Threshold Input). Each channel has a 2:1 expansion ratio below the floating threshold.

If at least one channel has an active **music** or **NOM** button, the **music** tab appears on the right margin of the Master Pane. Click the **music** tab to open the Dugan Music System panel. If more than one group has a music channel, additional columns appear for each group.

NOTE: To learn how to set the various controls on this panel, see Setting Controls on page 37.

Figure 8-1 Dugan Music System panel with one active group

Meter

The meter can show the Music System Threshold Input level or the amount of NOM Gain Limiting. Clicking the title button toggles between them.

NOM Gain Limit

This field controls the NOM (Number-of-Open-Mics) Gain Limit. Enter a new value from 1 to 10 (default = 1).

Music System Threshold Input Channel

For each Group, click the **music thresh input ch.** button to select the channel or Matrix Mix Bus from which the Music System in this group derives its threshold.

Music System Threshold Input Level

The **music system threshold** fader sets the input level for this group's Music System threshold. It acts as a master threshold for all music mode channels in the group. The LED indicates signal presence or overload.

Auto Mix Depth

This control sets the maximum amount of attenuation applied by the Music System. The default setting is -15 dB.

Setting up the Music System

The Music System can be used to duck mics not in use by comparing them to an ambient sensing mic.

The Music System can also be used to duck the audience mics when the people on stage talk, preventing PA bleed into the mix. Use a submix of the stage vocal channels (post-Dugan) to supply this threshold signal instead of a sensing mic. A Model E-3A mix bus could be used to create this threshold signal.

Some channels can be set to the Music System while others are in the Speech System. Unlike the Speech System, the Music System channels should be patched post-EQ, *pre-fader* so that fader and threshold adjustments remain independent.

To set up the Music System, you can:

- Send a music system threshold signal from the console to any available input to be used as the Music System Threshold Input of a Dugan group.

  - *OR* -

- Use a Matrix Mix Bus as a source.

Using a Sensing Mic

Consider the following before placing a sensing mic:

- Use the same type of mic for program and sensing applications.
- Place the sensing mic in the same area, and pointing in the same direction as the program mics.

  This samples, as closely as possible, the ambient sound picked up by the program mics.

- Do not place the sensing mic close to an individual voice or instrument.
- Do not point the sensing mic at a pit orchestra.
- Do not put the sensing mic in the back of the house because of the time delay.

To use a sensing mic:

1. Connect the sensing mic to an available console input.
2. Deselect all mix buses from that input strip.
3. Set the console input gain for the sensing mic 10–15 dB higher than the program mics.
4. Route that input's direct out to an available AES or ADAT output.
5. Patch that console output to an unused AES or ADAT input on the Model E-3A.

Using a Submix from the Console

To use a submix from the console:

1. Route the submix to an available AES or ADAT output.
2. Set the submix controls to unity gain.
3. Patch the console's output to an unused AES or ADAT input on the Model E-3A.
4. On the Music System Master Pane, select that input as the source of the Music System Threshold Input.

Using a Mix Bus Submix

To use a mix bus submix:

1. Choose one of the six internal mix buses (mix 1–6).

   See *Mix Bus Masters* on page 49.
2. Make the bus internal by setting its destination to **mix bus**.
3. In that mix bus matrix row, enter 0 dB for each channel or input that you want to contribute to the ducking action.
4. On the Music System Master Pane, select that mix bus as the source of the Music System Threshold Input.

Completing Setup of the Music System

To continue setting up the Music System (sensing mic or submix):

1. On the Dugan's Channel Pane, activate the **music** button on the desired channels.

   The **music** tab will appear on the Master Pane when at least one channel is assigned to the Music System.

2. Click the **music** tab on the right margin of the Master Pane to open the Music System panel.

   A column of controls appears for each group that has at least one active music channel.

3. Enter the input channel or Matrix Mix Bus that you chose to use for the **music thresh input ch.** for that group.

4. If the meter is set to **NOM gain limiting**, click the title to toggle it to **music threshold level**.

5. Start with the **music system threshold** fader(s) set to 0 dB (default).

   See *Setting Controls* on page 37 to learn how to enter values.

6. On the Channel Pane, start with all channel **thresh** controls at 0 dB (default).

7. Activate the **auto** buttons for all channels in use, and the **mute** buttons for unused channels.

8. On each channel, activate the **preset** button adjacent to the selected mode.

   This preserves your mode settings when the unit is powered off and on.

9. For each group, set the **music system threshold** fader so the **auto mix gain** for each affected input channel hovers around -15 dB.

   If all the channel **auto mix gain** displays stay at full gain, the threshold signal is missing or too low.

10. Use the **thresh** control to fine tune each channel so its **auto mix gain** display stays close to -15 dB when that mic is not being used.

---

iPad   *To close the Music System pane on an iPad, swipe it to the right.*

Controlling Ambience

Unlike the Speech System, the Music System does not maintain constant ambience. If you need to smooth out the ambience, two methods can be used separately or together:

- The **last hold** function keeps the last mic used at full gain. The **last hold** is activated when a channel's **automix gain** stays above -3 dB for 0.5 seconds. When another mic passes the same criteria, it becomes the **last hold** mic.

  To activate the **last hold** function for a group, click that group's **last hold** button.

- Raise the **auto mix depth** control until you do not hear an objectionable shift in ambience. Just a few dB of attenuation may suffice to reduce bleed or feedback.

Gain Limiting

To learn the basic concepts used in gain limiting, see Chapter 2: *Theory of the Speech and Music Systems*.

Gain Limiting and the Music System

The Dugan's unique implementation lets you set the number of mics allowed at full gain before gain limiting occurs. This can prevent feedback as the Music System turns on more mics.

NOTE: *Gain Limiting is the only automatic mixing function that can be active when a channel is in **man** mode.*

To activate Gain Limiting:

1. Activate the **NOM** buttons on each channel you wish to include.
2. Set the master **NOM gain limit** field to the maximum number of mics that you will allow at full gain simultaneously (default is 1; range is 1–10).
3. Toggle the meter title to **NOM gain limiting** to view the amount of gain reduction.

Gain Limiting and the Speech System

The Speech System always maintains NOM = 1, which makes Gain Limiting unnecessary. Typically, the **NOM** controls have no effect when using the Speech System. However, the **NOM** function can help avoid feedback when:

- mics are switched to manual;

  - OR -

- the Master **OVERRIDE** button is pressed with multiple mics selected.

If either case applies,

1. Turn on **NOM** for all channels.
2. Set the **NOM gain limit** field to **1**.

If some channels are set to Speech System and others to Music System, you can choose whether they should interact. If you do not want the master gain reduction of the Music System mics to affect those in the Speech System, turn the **NOM** buttons off for the Speech System channels.

Musical Theater

When an actor sings and speaks, like in musical theater, it is best to switch between the Dugan Music and Speech Systems.

If your console allows separate pre- and post-fader insert points:

1. Patch two channels on the Dugan for each singing/speaking mic: One pre-fader for the Music System, and the second post-fader for the Speech System.
2. To automate switching between singing and speaking, use scenes on the console to alternately activate the appropriate insert, or switch channel modes between **auto** and **man** using scenes on the Dugan (see *Scenes Panel* on page 52).

   For example, when the actor sings, the Speech System channel would be in **man** mode while the Music System channel is in **auto** mode.

If your console does not allow separate pre- and post-fader insert points:

1. Patch the Dugan post-fader.
2. Activate **music** for the channel when the actor sings.
3. To automate switching between singing and speaking, use scenes on the Dugan to toggle the **music** button (see *Scenes Panel* on page 52).

Chapter 9: Front Panel

Since the front panel is so small, use the Dugan Control Panel on a computer or iPad if available. If necessary, the Model E-3A front panel can perform all operations of the Dugan Control Panel except editing names. It has a display, navigation arrow buttons, and a dual-function encoder knob that can be pushed or turned. The cursor is a box around a selected item that is moved using the navigation arrow buttons.

Figure 9-1 Dugan Model E-3A front panel

NOTE: Pressing the **ENTER** button or the knob performs the same function. We will refer to the item which is easiest to use in the context.

All Channels Screen

This displays the modes and automix gains of all channels, and like the Top Pane in the Dugan Control Panel, lets you to select a block of eight channels to view in detail.
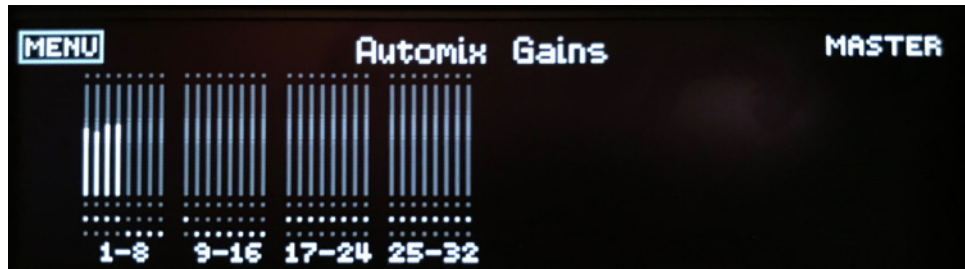

Figure 9-2 All Channels screen

Top Row

Activating **MENU** or **MASTER** jumps to the Menu or Group Master screens, respectively.

To change the meter display:

1. Use the navigation arrow buttons to highlight the meter selection in the center of the top row.

   It will read **AUTOMIX GAINS**, **INPUTS**, or **OUTPUTS**.

2. To change the meter mode, turn the knob.

   The display changes without pressing the knob. When finished, use the navigation arrows to continue editing other parameters.

Channel Block Selection

To view a block of eight channels in detail:

1. Use the navigation arrows or turn the knob to select the desired block.

2. Press the **ENTER** button or the knob to switch the display to that eight-channel block (see below).

Eight Channels Screen

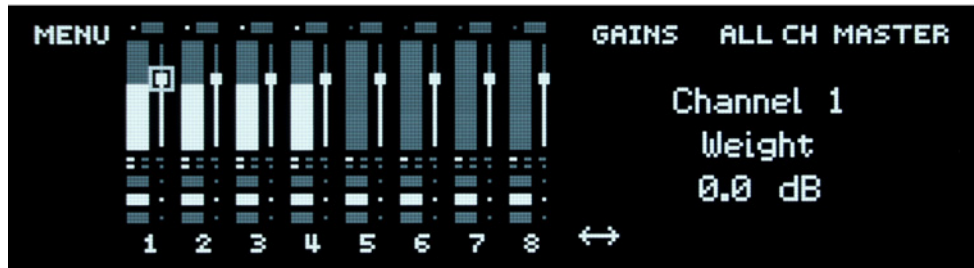The screen has three navigable sections, each discussed below.

Figure 9-3 Eight Channels screen with channel 1's **weight** control highlighted

Although the miniature control panel uses the full screen height, the hierarchy of controls is not entirely obvious. The top row items are *above* the channel controls, and the double arrows are *below* them. Figure 9-4 has been altered to show how to navigate the controls.
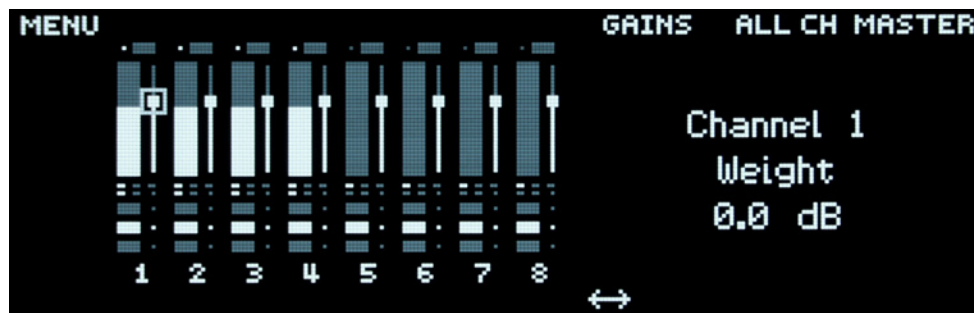

Figure 9-4 Altered Eight Channels screen clarifies how to navigate the controls

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TIP: *Press the left and right arrow navigation buttons together to jump to the double arrows from anywhere on the screen.*

Top Row

MENU, **ALL CH**, and **MASTER** jump to their respective screens.

To change the meter display in the control panel:

1. Use the navigation arrow buttons to highlight the meter selection in the top row.
   It will read **GAINS**, **INPUTS**, or **OUTPUTS**.

2. To change the meter mode, turn the knob.
   The display changes without pressing the knob. When finished, use the navigation arrows to continue editing other parameters.

Miniature Control Panel

This miniature Dugan Control Panel displays real-time channel activity, and can be used to operate the unit if necessary. The Dugan Control Panel's controls are all available. Each control's label and value appear on the right side of the screen when that control is selected.
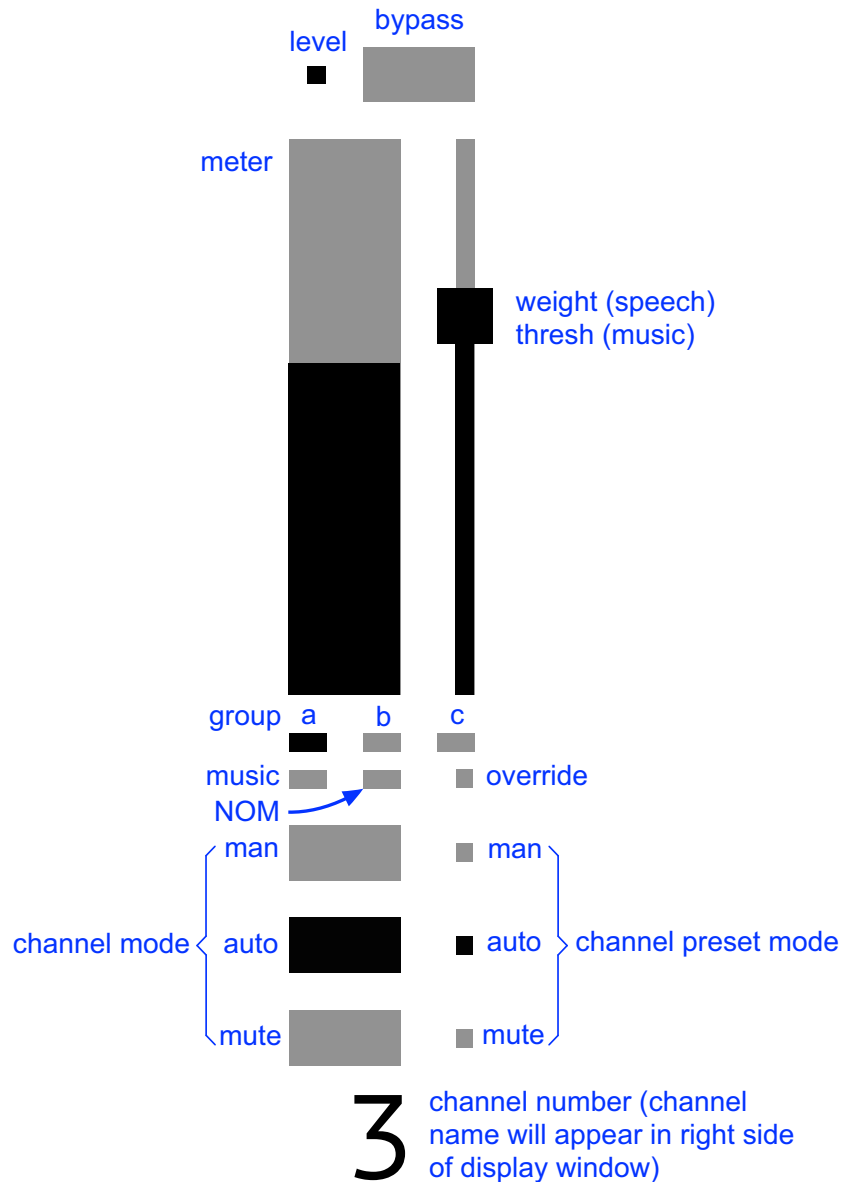

Figure 9-5 Channel controls detail

To understand these controls, see Chapter 6: *Dugan Control Panel Software*.

Bottom Row

When the double arrows are highlighted, rotating the knob selects the next or previous group of eight channels to display.

Group Master Screen

Each group with channels assigned to it has a Group Master screen.

Figure 9-6 Group Master screen

Top Row

Clicking the **BACK** item returns you to the previous screen.

Group Master Controls

Nine items can be highlighted. The double arrow jumps to other groups if present. The arrows are inactive if no other groups exist.

To learn about these group controls, see *Group Master Controls* on page 51.

Menu Screen

This screen accesses the setup (right) and operational screens (left).

WARNING: Select **Factory Reset** ONLY if you wish to completely erase all settings, including the unit's name, scenes, and IP address.
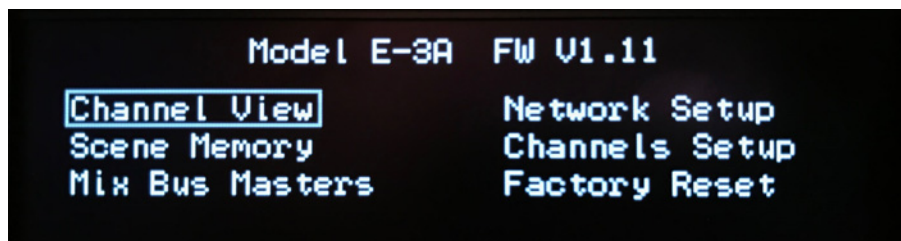

Figure 9-7 Menu screen

Channels Setup Screen

This screen lets you choose the desired number of **AES** and **ADAT Channels** and the **Sync** source to use with this device.
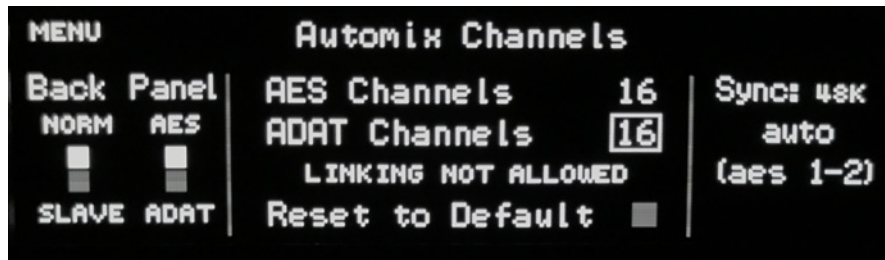

Figure 9-8 Channels Setup screen

Back Panel Switches

The **NORM-SLAVE** and **AES-ADAT** switches display the modes set by their respective back panel switches (see *Model E-3A Modes* on page 23) and cannot be changed from this screen.

Automix Channels

In AES mode:

1. Navigate to **AES Channels**.

2. Turn the knob to select **8–16** channels.

3. By turning the knob past 16, you can add 8 or 16 ADAT channels.

In ADAT mode:

1. Navigate to **ADAT Channels**.

2. Turn the knob to select **8** or **16** channels.

To increase the number of mirrored channels, activate **Disable Linking**. Note that using 16 ADAT channels automatically disables linking.

Reset to Default

Activating this button sets the Automix Channels to **16** AES or **8** ADAT, depending on the mode.

Sync Source

The **Sync** source is automatically set to **AES** or **ADAT** based on the selected mode. How-ever, if a word clock signal is detected at **WORD CLOCK IN**, the **Sync** source is automatically set to **WDCLK**.

Although you probably will not need to set a **Sync** source manually, you can select the desired source and press **ENTER**.

NOTE: *The **INTERNAL Sync** source setting is provided for test purposes only. The Dugan is not normally used as the sync master.*

Network Setup Screen

This screen lets you configure the control network parameters for this device. Connect your Dugan Control Panels to this port.

```
MENU            Network Setup
       DHCP: ■   Factory Defaults: ■

       IP Address: 010.000.001.107
          Netmask: 255.255.255.000
          Gateway: 010.000.001.001
```
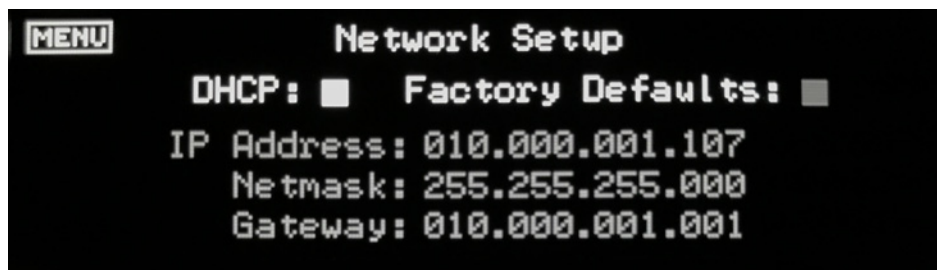
Figure 9-9 Network Setup screen

Select **DHCP** which asks a router to automatically supply valid **IP Address, Netmask**, and **Gateway** values.

If you wish to set the IP address settings manually, navigate to each three-digit group and turn the knob to change the value.

When you click **MENU** to exit, if you made any changes a dialog appears. Click **CANCEL** to discard changes or **APPLY** to save them.

See Chapter 5: *Connecting to a Computer* to troubleshoot network settings.

Mix Bus Matrix

The matrix lets you route signals to up to six mix buses, with gain control at each crosspoint. In addition to automixed channels, you may patch any input channel directly to buses.

Mix Bus Matrix Masters Screen

This screen lets you assign which outputs to use for the **MIX BUS MASTERS**. You can use up to six mix buses.

Figure 9-10 Mix Bus Masters screen

To assign destinations to the mix buses:

1. Use the arrow keys to navigate to each mix bus output title.

2. Turn the knob to select the desired output.

Select **MIX** to use a mix bus internally as a Music System Threshold Input.

This screen includes the same controls found in the **mix bus masters** screen in the Dugan Control Panel (see page 49).

To make these settings from this screen:

1. Use the arrow keys to navigate to the desired control.

The name and value appears on the right side of the screen.

2. Press **ENTER** to toggle a button.

3. Turn the knob to adjust a master gain fader.

4. To set up the matrix crosspoints, select **MATRIX** from the top-right (see next section).

Mix Bus Matrix Screen

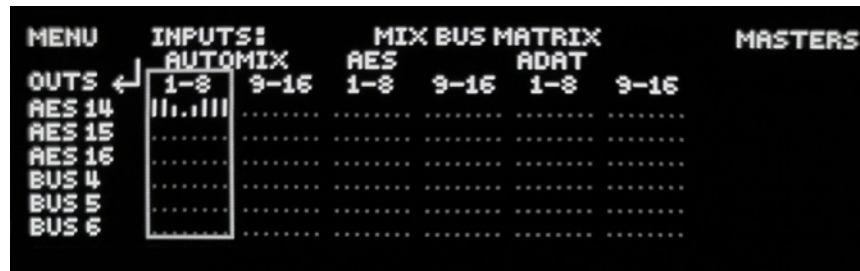This screen provides an overview of the mix bus matrix.

Figure 9-11 MIX BUS MATRIX screen

To set crosspoint gains, navigate to the desired eight-channel block, and press the knob to select it. The **MIX BUS MATRIX** eight-channel screen appears.

Mix Bus Matrix Eight Channel Screen

This screen lets you set the individual crosspoints. Navigate to the crosspoint and turn the knob to set the crosspoint gain between 0 dB (unity gain) and -96 dB (off).

Figure 9-12 MIX BUS MATRIX eight-channel screen

The figure above shows how to create a mix minus for a loudspeaker above mic 4, while tapering off the gains of the mics (3 and 5) adjacent to that speaker.

TIP: *To quickly set a crosspoint on or off, navigate to the crosspoint and press **ENTER** to toggle between 0 and -96 dB.*

Scene Memory Screen

This screen lets you recall, save, and create a new scene. Scenes include all Model E-3A parameters except the network setup and the name of the unit. The last scene recalled shows at the top of the screen. A ***** at the end of the **Active Scene** name indicates it has been edited and does not match the stored scene.
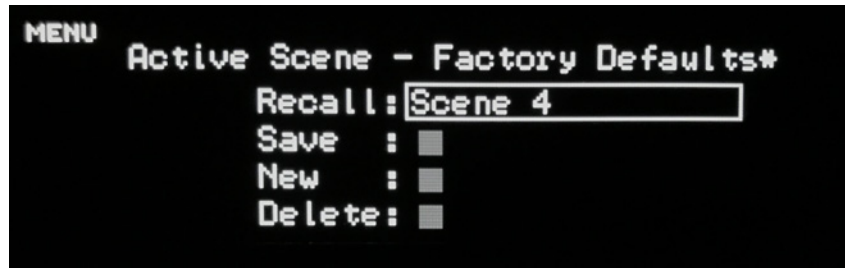

Figure 9-13 Scene Memory screen

To recall a scene:

1. Navigate to the scene name field (to the right of **Recall**).

In Figure 9-13, the scene name is **Factory Defaults**.

2. Turn the knob to scroll through scenes.

They display in alphanumeric order.

3. Press the knob to recall that scene.

To save the current scene:

1. Navigate to the **Save** button.

2. Press **ENTER.**

The scene updates with the current state of the unit.

The **Save** button is inactive if the scene has not been edited.

To create a new scene:

1. Navigate to the **New** button.

2. Press **ENTER.**

A new scene is created with the current state of the unit. An automatically generated number is assigned. Scene names can be edited on the Control Panel for Java.

To reset all parameters in the unit except the network setups and the unit name, recall the **Factory Defaults** scene.

The **Factory Defaults** scene cannot be modified. If you make changes with **Factory Defaults** as the active scene, click **New** to save the current state of the unit under a different name.

See Chapter 6: *Dugan Control Panel Software* to learn how to name and otherwise manage scenes.

Chapter 10: Updates

Updates for the Model E-3A can be downloaded.

iPad	*To update your Dugan unit firmware, iPad users must connect their Dugan to a computer and run the Dugan Utility.*

To update the Dugan Control Panel for iPad, connect the iPad to the Apple App Store.

To update your device's software and firmware:

1. Connect to the Internet and download **Dugan-Software-***yyyymmdd***.zip** from:

   http://www.dandugan.com/downloads/

   After the download is complete, the Internet connection is no longer necessary.

2. Unzip the software package.

   It contains the **Dugan-Control-Panel-***vxxx***.jar** and **Dugan-Utility-***yyyymmdd***.jar**. The Dugan Utility contains the latest versions of both the firmware and a safety copy of the Dugan Control Panel that loads automatically into the unit.

   To revert to a previous version, launch the older version of the Dugan Utility and force an update by Ctrl-clicking the **Update Firmware** button. This will install the firmware corresponding to that version of the Dugan Utility.

3. Connect the computer to the Dugan units you wish to update.

4. Launch **Dugan-Utility-***yyyymmdd***.jar**.

   The Dugan Utility window appears.

   If the Dugan Utility does not launch, install the Java Runtime Environment.
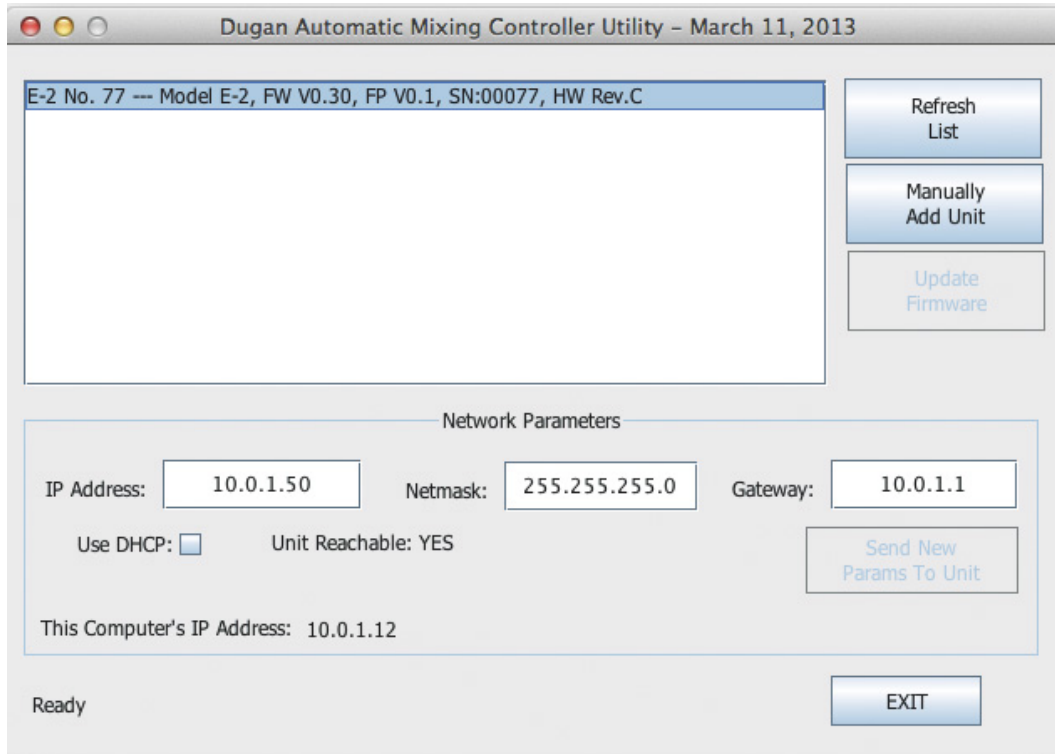
Figure 10-1 Dugan Utility

If you do not see the Dugan unit(s) on your network in the list, see *Connecting to a Computer* on page 27.

5. Select the unit to update from the list.

6. Make sure **Use DHCP** is *NOT* selected for that unit.

   Under certain network conditions, DHCP is not compatible with the firmware update process.

7. If you have deselected **Use DHCP**, click on **Send New Params To Unit**.

   The unit reboots.

8. Click **Update Firmware**.

   The unit reboots after the update completes.

9. Repeat steps 5 through 8 for each unit you wish to update.

NOTE: *To force an update when the **Update Firmware** button is not blue, Ctrl-click the button.*

NOTE: *If the firmware update process fails, your unit may not pass audio. To recover from this condition, repeat steps 5 through 8 above, but Ctrl-click the **Update Firmware** button.*

Appendix A: Connector Pinouts

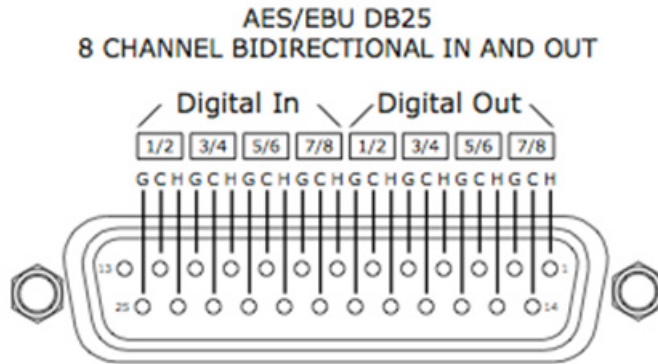DB-25 connectors are wired with the Tascam/Digidesign standard.

Figure 1-1 AES I/O pinout diagram

Table A-1 Audio 1–8

Pin	Signal
1	Chs. 7–8 Out Hi
2	Chs. 7–8 Out Gnd
3	Chs. 5–6 Out Lo
4	Chs. 3–4 Out Hi
5	Chs. 3–4 Out Gnd
6	Chs. 1–2 Out Lo
7	Chs. 7–8 In Hi
8	Chs. 7–8 In Gnd
9	Chs. 5–6 In Lo
10	Chs 3–4 In Hi
11	Chs. 3–4 In Gnd
12	Chs. 1–2 In Lo
13	unused
14	Chs. 7–8 Out Lo
15	Chs. 5–6 Out Hi
16	Chs. 5–6 Out Gnd
17	Chs. 3–4 Out Lo
18	Chs. 1–2 Out Hi
19	Chs. 1–2 Out Gnd
20	Chs. 7–8 In Lo
21	Chs. 5–6 In Hi
22	Chs. 5–6 In Gnd
23	Chs. 3–4 In Lo
24	Chs. 1–2 In Hi
25	Chs. 1–2 In Gnd

Table A-2 Audio 9–16

Pin	Signal
1	Chs. 15–16 Out Hi
2	Chs. 15–16 Out Gnd
3	Chs. 13–14 Out Lo
4	Chs. 11–12 Out Hi
5	Chs. 11–12 Out Gnd
6	Chs. 9–10 Out Lo
7	Chs. 15–16 In Hi
8	Chs. 15–16 In Gnd
9	Chs. 13–14 In Lo
10	Chs 11–12 In Hi
11	Chs. 11–12 In Gnd
12	Chs. 9–10 In Lo
13	unused
14	Chs. 15–16 Out Lo
15	Chs. 13–14 Out Hi
16	Chs. 13–14 Out Gnd
17	Chs. 11–12 Out Lo
18	Chs. 9–10 Out Hi
19	Chs. 9–10 Out Gnd
20	Chs. 15–16 In Lo
21	Chs. 13–14 In Hi
22	Chs. 13–14 In Gnd
23	Chs. 11–12 In Lo
24	Chs. 9–10 In Hi
25	Chs. 9–10 In Gnd

Table A-3 10 BASE T (Ethernet, TCP/IP)

Pin	Signal
1	T2
2	T1
3	R2
4	n/c
5	n/c
6	R1
7	n/c
8	n/c

Appendix B: Specifications

Digital Input and Output	
AES/EBU	AES3, 16 inputs, 16 outputs
Optical (ADAT)	Eight channels in and eight channels out 16-Channel mode: LINK connectors reassigned as ADAT channels 9–16
Gain	Unity
Sample Rate	48 or 96 kHz
Bit Depth	24 bit
Audio Latency	2 ms
Frequency Response	10 Hz – 22 kHz, $\pm$ 0.0075 dB
Output Noise	-125 dBFS (20 Hz – 20 kHz), -128 dBAFS
Distortion	-125 dBFS
Linking	Up to eight units can be linked into one system in an optical ring network Linking uses ADAT hardware but does not adhere to ADAT protocol
Synchronization	
Sources	Word clock, AES Inputs 1–16, ADAT, Internal
Connectors	
Audio	1–16: Two DB-25 connectors wired to TASCAM digital audio standard ADAT: Optical input and output
Control	Three RJ-45: Three-port internal network switch. One connector accepts PoE. Two Link: ADAT optical, reassigned as audio I/O in 16-channel mode
Word Clock	2 x BNC; 75 Ω input termination switch on circuit board (shipped in **OFF** position)
Power	
Connector	Coaxial with locking collar, 5.5 mm o.d., 2 mm i.d., center positive
Electrical	Nominal 12 VDC, 1.5 A maximum; accepts 12–24 VDC
PoE	802.3at Type 2 25.5 W
External Supply	Input: 100–240 VAC, 50–60 Hz, 30 W Output: 18 VDC, 1.33 A Approved: UL, CE
Dimensions	1RU H = 1.75 in (4.5 cm); D = 8.3 in (21 cm); W = 8.75 in (22.2 cm)
Weight	3.4 lb (1.5 kg) 5.8 lb (2.6 kg) in shipping box with power supply