Dan Dugan Sound Design

Model E Automatic Mixing Controller

User Guide
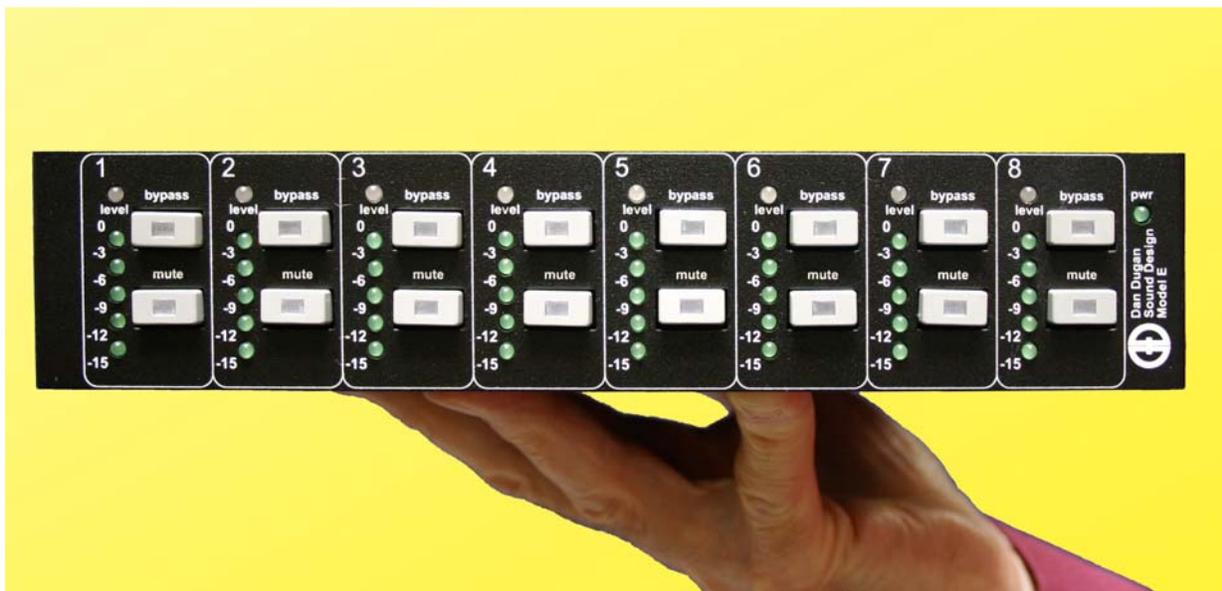
Important Safety Instructions and Warnings

The Model E'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.

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 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

1.1 Conventions

We will use:

- *activate* to mean toggling on a button (LED lit).

- *de-activate* to mean toggling off a button (LED not lit).

- *select* to mean pressing a button repeatedly until the desired LED is lit.

1.2 Introduction to the Model E

The Model E Automatic Mixing Controller helps professional audio mixers handle multiple live mics without having to continually ride their individual faders. This eight-channel signal processor patches into the input insert points of an audio mixing console. It 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's voice-controlled crossfades track unscripted dialogue, eliminating cueing mistakes and late fade-ups while avoiding the choppy and distracting effects common to noise gates.

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

- Conference reinforcement, video trucks

- Houses of worship

- Film and television dialogue, reality shows

- Multiple wireless mics for theater

- Boardrooms, civic meeting rooms, community TV

- Teleconferencing and distance learning

The Model E has many other features that dramatically improve the performance of live mixing with multiple mics:

- Eliminates late upcuts

- Reduces PA feedback and studio noise

- Analog or digital connection

- Internal Web server for remote control panel

- Half-rack size–mount two in one RU

- Link units for up to 64 mics

- Connects to mixer with TRS insert cables

1.3   Remote Control and Software

The Model E can be controlled three ways:

- front panel controls on the Model E
- Web Control Panel (see Chapter 5: *Web Control Panel*)
- ASCII commands via Ethernet (see Chapter 6: *ASCII Remote Control*)

There are four computer programs associated with the Model E. They are all stored in flash memory in the device.

- A web page within your browser runs the Java applets (*devlist.htm* and *dugane.htm*) that display the two panes of the real-time control panel. This web page (*index.htm*) is provided on a disc with the unit, can be downloaded from our web site, or downloaded from the unit when you browse to its IP address.

- Operating firmware governs booting, switching, communications, and displays

- DSP firmware embodies the Dugan Speech System algorithm.

Any of these programs can be updated in the field. Subscribe to the Yahoo group *duganusers* for news on updates. To install updates, see Chapter 7: *Firmware Updates*.

Chapter 2: Quickstart

This section provides step-by-step instructions to help you get started quickly. It includes information to connect and install the Model E, make initial settings, and link units.

Step 1 Connections

Connect the provided power supply to the Model E.

Set the **NORM-SLAVE** switch on the rear panel to **NORM** (up) for normal (not linked) operation.

The Model E can be interfaced with:

- an analog mixing board;

- a digital mixing board using analog or digital connections;

Analog

The Model E is a line-level device normally patched into the insert jacks (send and return) for each mic input channel on the board. Check the insert jack wiring on your mixing board. If they are 1/4-in TRS jacks (wired tip = send, ring = return), use TRS-TRS insert cables to connect the Model E. Other configurations require special cables. The Model E is wired as follows: tip = input, ring = output.

Figure 2-1 Analog connection

Digital I/O

The Model E may be connected to a digital mixing board with ADAT connections that transmit eight channels on each digital audio optical cable. Connect the console ADAT output to the Model E **LINK IN**, and the Model E **LINK OUT** to the board's ADAT input. On the mixing board, insert the ADAT inputs and outputs on each mic channel, post-fader.
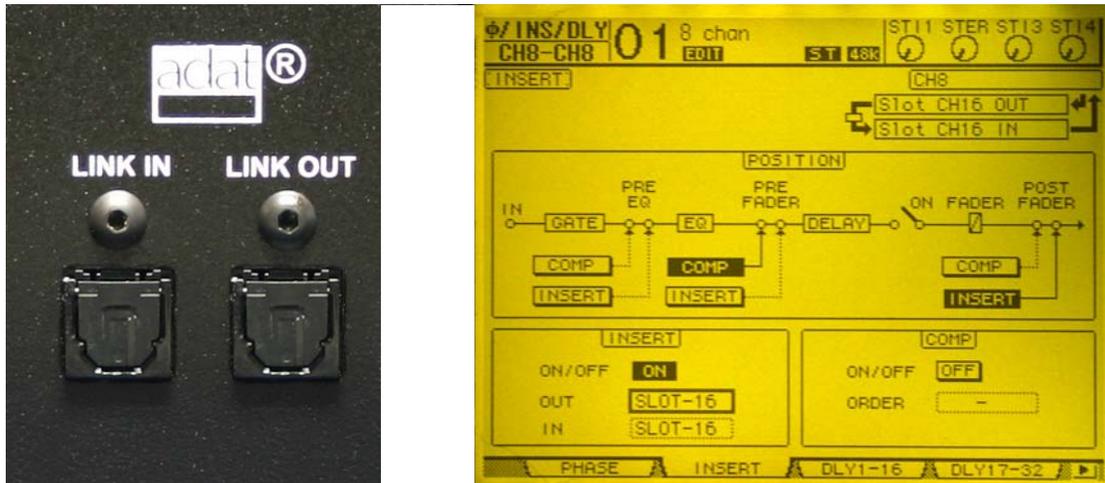
Figure 2-2 Digital connection

Step 2 Power-up Commnads

The Model E can execute six commands during power-up. Each command is selected by holding down a specific button during the entire power-up process. Power-up is complete after the **bypass** LEDs light sequentially and extinguish. The three commands shown below are the most common. See *Power-up Commands* on page 17 to learn about the additional modes.

Reset Audio

Hold the channel 1 **bypass** button down to set all parameters to factory default settings, clear label text, and set the I/O to analog. We recommend starting an installation in this mode.

Digital I/O

Hold the channel 3 **bypass** button down to switch all I/O to the ADAT link connectors. Linking is not possible and the analog connectors are inoperative.

Analog I/O

Hold the channel 3 **mute** button down to switch all I/O to the analog connectors. Digital connectors are available for linking.

Step 3 Linking Multiple Units

All linked units must be in analog audio I/O mode and use analog connections to the board because linking requires the digital I/O connectors. Up to eight Model Es (64 channels) can be linked into a single system that maintains the gain of one mic from the room no matter how many mics are connected. One unit must be the master and the others slaves.

Set the **NORM-SLAVE** switch on the rear panel to **NORM** (up) to designate that Model E as the Master. Set the **NORM-SLAVE** switch on the rear panel to **SLAVE** (down) to designate that Model E as Slave.

Link units in a ring configuration as shown below. Note that all **LINK IN** and **OUT** connectors are used to create the ring.
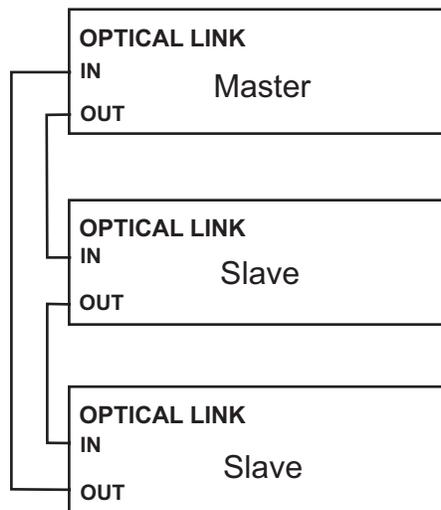
Figure 2-3 Linking units

Step 4 Operation

Raise your console preamp gains until the Model E's green **level** LEDs stay illuminated when the room is quiet. The **level** LED illuminates green when the input level is within the acceptable range for automatic mixing and flashes red to indicate clipping. There should be enough gain ahead of the Model E to maintain the green LED at all times.

NOTE: *When the green light goes out, the channel is in a downward expansion mode to avoid feedback. This condition should be avoided because the smooth ambience characteristic of Dugan automatic mic mixing is lost.*
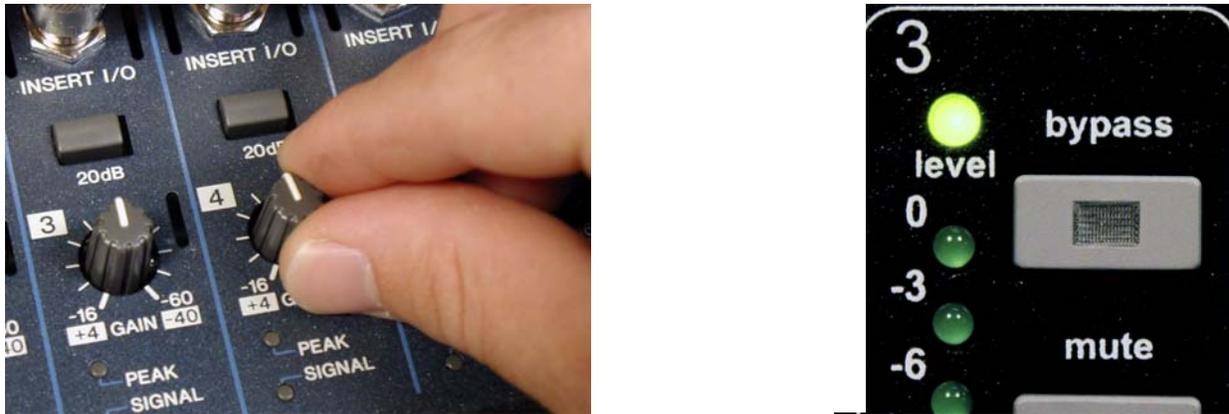
Figure 2-4 Setting console preamp gain

If there is insufficient gain to keep the **level** LEDs lit green when no one is talking, set the rear panel **LEVEL** switch to **-10**. Sufficient ambient sound level at the input is about -50 dBu in +4 mode and -62 dBu in -10 mode.

The Model E does not limit, compress, or control levels. It performs just one critical function: cuing multiple mics. The Dugan Speech System cross-fades mics while maintaining a natural low level of ambience with minimal feedback. It is essential to distinguish this behavior from the annoying fluctuation of levels and uneven ambience produced by a conventional gating system.

When one person talks into the Dugan Speech System, it rapidly fades that mic's gain up and the others down. When the talker pauses, all mics crossfade to a medium gain that equals the sound of one mic at full gain. When several people speak simultaneously, the gain is shared. Thus, all mics sound normal when used, multiple open mics do not cause noise build-up or feedback, and the mixer can leave the faders up.

The LED gain meters show the channel gains resulting from the process. *They are not level meters!* Adjust your board's preamp gains so all LED meters float at about the same gain when no one is talking. This procedure will assure smooth automatic mixing.

With the optimum balance set such that the gain meters hover around the same level with no one talking, the faders may not end up in a line. The fader for a softer speaker will be higher than a louder one. Automixing does not require cueing the faders in and out, so fader position is not important.

Instead of pulling the faders down, leave them up and use the Model E's **mute** buttons to mute mics. This is necessary because on most mixers the analog insert points are pre-fader. If a fader is pulled down to mute a mic, that mic's signal remains in the process and *punches holes* in the ambience. If your mixer can patch inserts post-fader, you need not be concerned with this.

Chapter 3: Installation

Units shipped to the USA include a 120 VAC power supply. Contact the factory if you require a different power supply.

The section Section 3.1 *Bench Tests Before Installation* is intended for experienced technicians to test the Model E prior to installation. Those without test equipment can begin in *Audio Wiring* on page 14. In either case, we recommend placing the Model E in a convenient place in the mixer's line of sight. Rack ears can be removed.
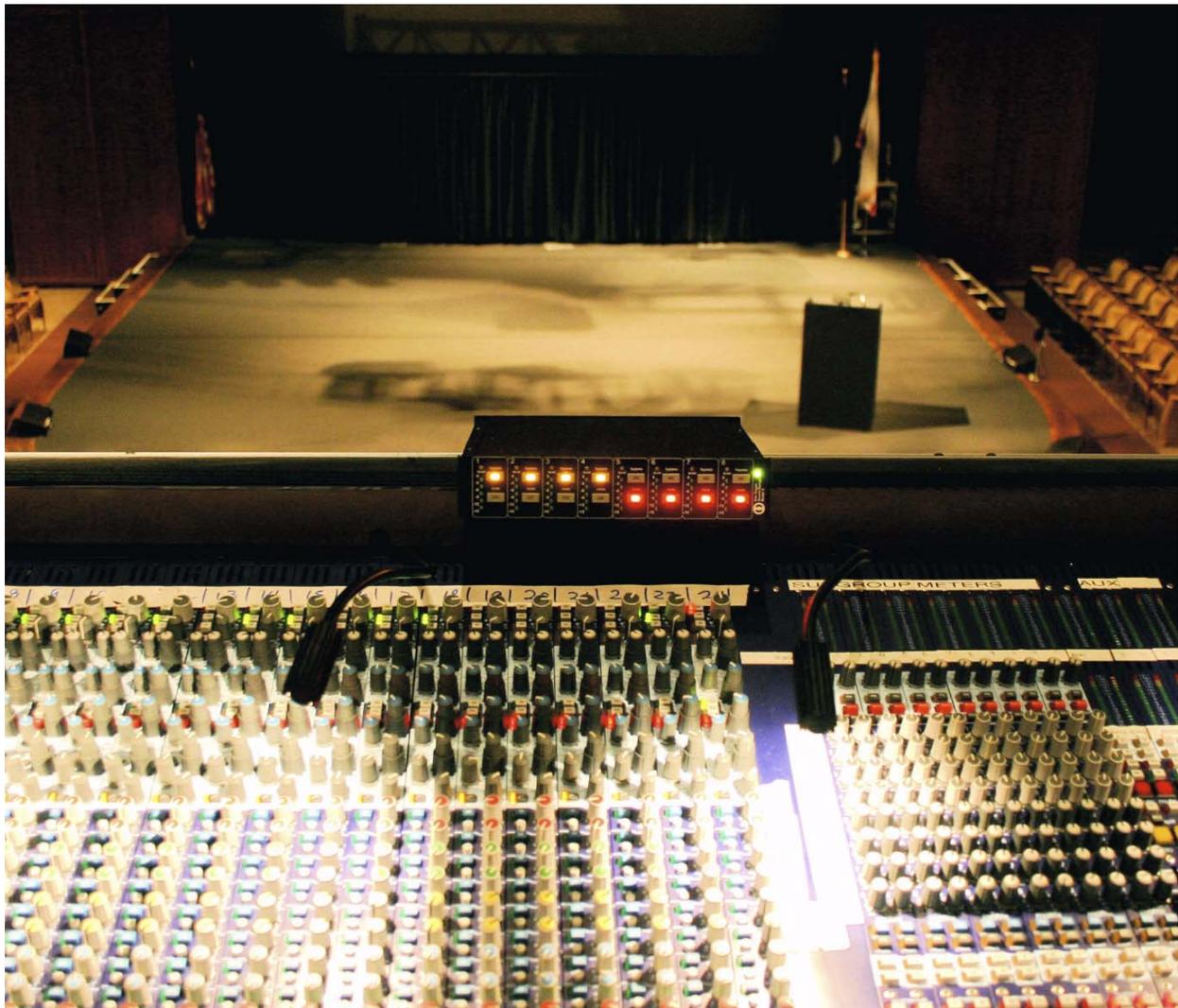
Figure 3-1 Model E placed conveniently

3.1   Bench Tests Before Installation

The Dugan Speech System can be tested with the following procedure:

1. Connect two different oscillators to inputs 1 and 2.

2. Set both to 1 kHz frequency and 0 dBu level (or -20 dBFS in digital).

3. Fine-tune the frequency of one oscillator so that the Model E gain indicators bounce up and down at about 2 Hz (1000/1002 Hz).

4. Adjust the oscillator levels so that the gain displays are equal.

5. Leaving one oscillator in input 1, move the second signal to input 3, 4, etc., observing the bouncing display. This is a good way to test linked systems.

NOTE: *The two inputs mix in the side chain control mix bus. The signal level on this bus beats between no signal (subtraction) and +6 dB (addition) as the waves phase against each other. When the two waves cancel in the control mix, both channels will rise to full. Gains bounce down to -6 dB when the two waves add.*

3.2   Audio Wiring

3.2.1   Analog I/O

The eight channel inputs and outputs are *TRS* insert jacks. The Model E receives signal on the *Tip* and sends the return from the *Ring*.

Figure 3-2 Analog connection

When the Model E is off, the audio signal passes through unaltered, so the unit may be left patched when not in use.

The Model E can be connected to the insert or the line level input jacks.

Insert

This is the normal way to connect the Model E using a mic-level signal. Patch the audio channels in the insert loop (send-return) of each console input strip. Check the insert jack wiring on your mixing board. If they are 1/4-in TRS jacks (wired tip = send, ring = return), use TRS-TRS insert cables to connect the Model E. Other configurations require special cables. The Model E is wired as follows: tip = input, ring = output.
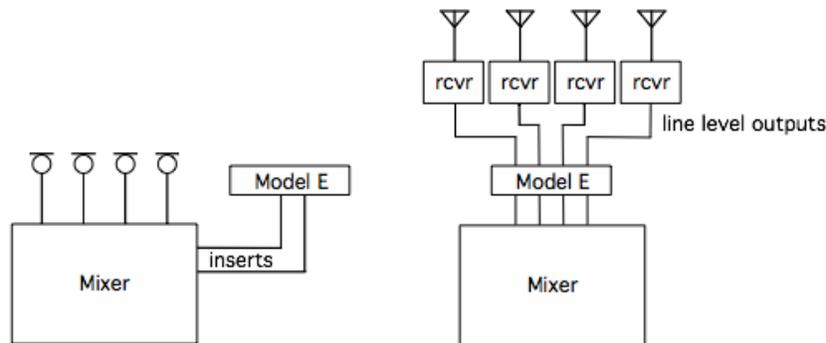
Figure 3-3 Analog insert (left) and line level (right) block diagrams

Line Level

This is an optional method of connecting the Model E to line-level devices, such as wireless mic receivers. Use split insert cables. The receiver output is wired to the tip of the TRS plug. The connector for the mixer's line input is fed from the TRS plug's ring.

3.2.2   Digital I/O

Start up the Model E in Digital I/O mode by holding down the channel 3 **bypass** button. This switches all I/O to the ADAT link connectors. Linking is not possible and the analog connectors are inoperative.
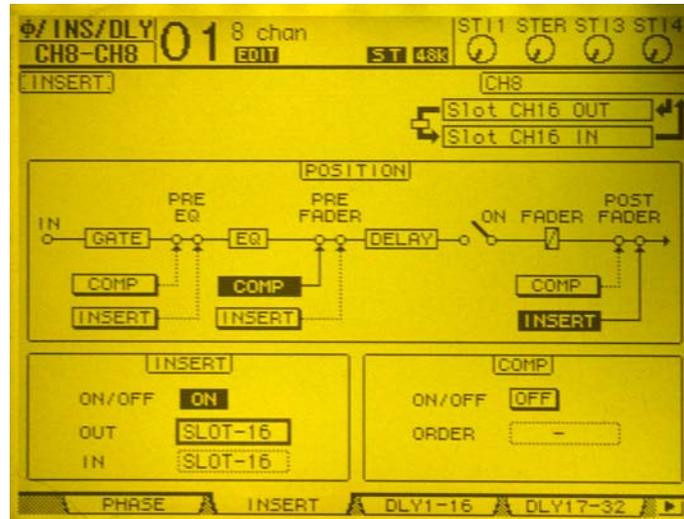
Figure 3-4 Insert post-fader for Speech System

On your digital mixer's patch configuration screen, patch the ADAT port channels as post-fader inserts.

3.3　Setting Levels

3.3.1　Analog

Program levels from -20 to +4 dBm are within the acceptable range; 0 dBm is optimal. The **level** lights are green for normal operation levels and flash red at the overload point.

If there is insufficient gain to keep the **level** LEDs lit green when no one is talking, set the rear panel **LEVEL** switch to **-10**. Sufficient ambient sound level at the input is about -50 dBu in +4 mode and -62 dBu in -10 mode.

3.3.2   Digital

Adjust the console input gain trimmers so that talking signal levels at the sends are between -20 and 0 dBFS, and room noise at the sends is higher than -75 dBFS. Console input gains should be high enough so the **level** lights stay green all the time, but do not turn red on peaks.

3.4   Power-up Commands

The Model E can execute one of six commands during each power-up. Select the command by holding down a specific button during the entire power-up process. Power-up is complete after the **bypass** LEDs light sequentially and extinguish.

System Reset

Hold the channel 1 **bypass** button down to set all parameters to factory default settings, clear label text, and set the I/O to analog. We recommend starting an installation in this mode.

Network Reset

Hold the channel 1 **mute** button down to set these parameters to their default values:

IP:	192.168.0.1
Netmask:	255.255.255.0
DNS:	192.168.0.254
Gateway:	192.168.0.254
DHCP:	off

DHCP On

Turning DHCP on requests that the network assign an IP number to the Model E, if the network has that capability. To turn DHCP on, hold the channel 2 **bypass** button down.

Display IP Address

Hold the channel 2 **mute** button down to display the address for 30 seconds. The bottom four LEDs of each bargraph represent one digit in hexadecimal format.

Table 3-1 Display of IP Addresses on Gain LEDs

	1	2	3	4	5	6	7	8
Value	0	0	0	0	0	0	0	0
8	X	0	X	X	0	0	0	0
4	X	0	0	0	0	0	0	0
2	0	0	X	0	0	0	0	0
1	0	0	0	0	0	0	0	X
hex address	C	0	A	8	0	0	0	1
address	192		168		0		1	

Digital I/O

Hold the channel 3 **bypass** button down to switch the input and output to the ADAT link connectors. Analog connectors become inoperative, and linking is not possible because the connectors are now used for digital I/O only.

Analog I/O

Hold the channel 3 **mute** button down to switch the input and output to the analog connectors. The Digital connectors are still available for linking.

Table 3-2 Power-up commands

	channel 1	channel 2	channel 3
bypass	System Reset	DHCP On	Digital I/O
mute	Network Reset	Display IP Address	Analog I/O

3.5   Linking

Multiple Model E units are linked in a ring so they operate as one system. Two standard optical audio cables (i.e., ADAT lightpipe or Toslink) are required to link two mixers. Note that using the digital I/O prohibits linking because there is only one set of connectors.

NOTE: This is different from the way the Models D and D-1 are linked.

Set one Model E to be the master by setting its rear panel **NORM-SLAVE** switch to the **NORM** (up) position. Set all other linked units to be slaves by setting their rear panel **NORM-SLAVE** switches to the **SLAVE** (down) position.

Link units in a ring configuration as shown below. Note that all **LINK IN** and **OUT** connectors are used to create the ring.

OPTICAL LINK
IN   Master
OUT

OPTICAL LINK
IN   Slave
OUT

OPTICAL LINK
IN   Slave
OUT
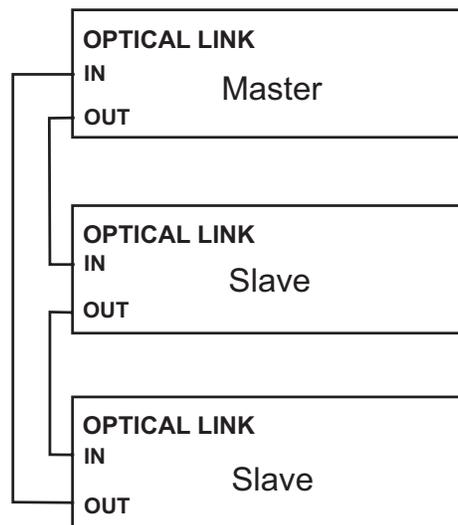
Figure 3-5 Linking Model Es

NOTE: Model Es may be linked with Models D-2 or D-3. Model Es will be in **group a***.*

Chapter 4: Operation

4.1   How it Works

The Dugan Model E Automatic Mixing Controller uses the Dugan Speech System™, a patented and trademarked automatic mixing function. The Dugan Speech System distributes the gain of one open microphone over the entire system, maintaining a natural one-mic ambience. It is essential to distinguish this behavior from the annoying fluctuation of levels and uneven ambience in a conventional gating system.

The system automatically manages any number of live mics in an unpredictable dialogue situation. When one person speaks, the system rapidly fades that mic's gain up and the others down. When the speaker pauses, all mics fade down so they sum to equal one mic at full gain. The result sounds like handing one mic around among the speakers. When several people talk at once, the gain is shared. This makes all mics sound normal when used but prevents buildup of noise or feedback.
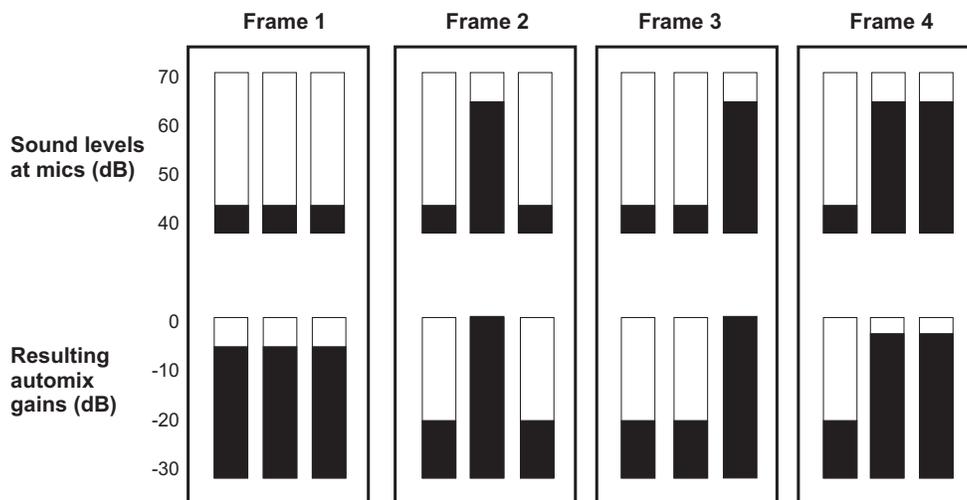
Figure 4-1

Figure 4-1 shows the Speech System in action, with four snapshots of a three-mic system.

- The first frame shows no one speaking; the sound levels at all mics are low. The system fades all channels to a medium gain that sums to the equivalent of one mic at full gain.

- The second frame shows one person speaking. The system automatically fades his/her gain to full, while the other two inputs are turned down.

- The third frame shows a different person speaking. The system automatically fades his/her gain to full, while the other two inputs are turned down.

- The fourth frame shows two people speaking simultaneously. The system automatically shares the gain between them, while the other input is turned down.

4.2   Settings
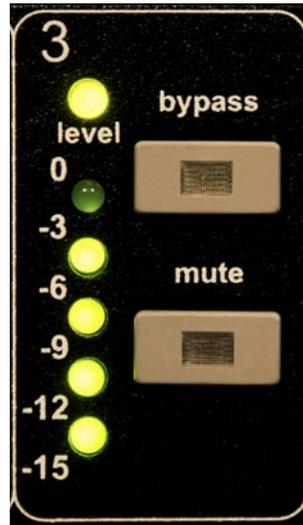
Figure 4-2

1. Put all the live mic channels in automatic mixing mode by deactivating **bypass** and **mute**.

2. Activate the **mute** buttons for all unused channels.

3. Using a normal speaking voice, adjust the console input trim controls to the highest possible gain without clipping.

   The input gain to the Model E should be high enough keep the **level** LED lit green during silences. If the input trim controls do not provide enough level, set the **+4/-10** switch to the **-10** position.

   If the preamp gain controls are set too low, the inputs drop below their minimum operating level. This causes downward expansion to prevent feedback but the smooth ambience is disrupted.

4. Set the console faders to your normal operating positions.

5. Balance the preamp gain controls so the fluctuating ambient noise registers equally on the Model E's meters.

   Note that raising the preamp gain of one channel causes its gain to rise and the others to fall; it's a balancing act. When balanced, all mics have equal access to the system gain.

6. If clipping occurs because someone speaks louder than expected, turn down all of the console's input trim controls the same amount, which maintains the ambient noise balance.
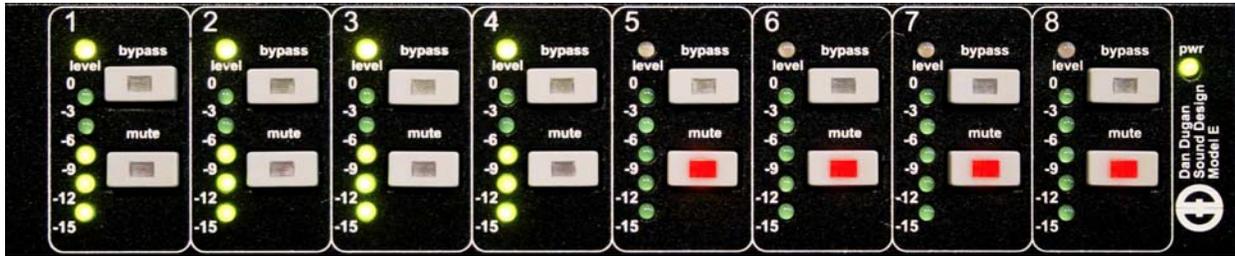
Figure 4-3 During ambience with 4 mics, **auto mix gain** displays should hover around -6 dB
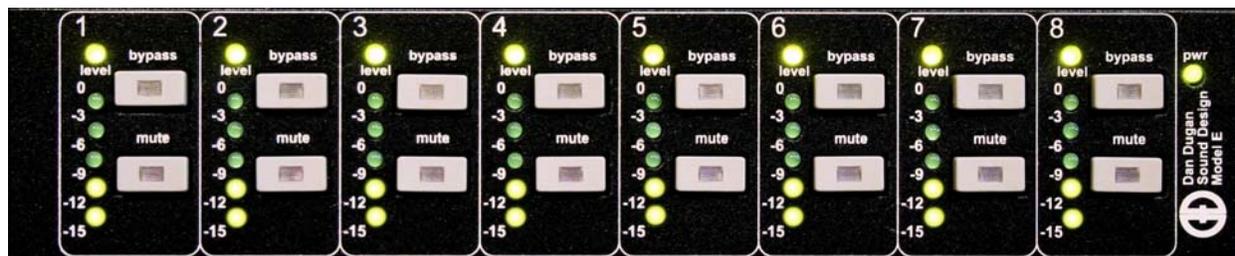
Figure 4-4 During ambience with 8 mics, **auto mix gain** displays should hover around -9 dB

TIP: *To eliminate unwanted noise in the mix, use the gain displays to locate the of-fending channel and activate its* **mute** *button.*

4.3   Pre-fader Insert

The Dugan Speech System works best if patched post-fader. If your console allows this, skip this section. If you use a pre-fader insert, this section describes how to properly mute channels and pre-listen to muted channels.

4.3.1   Muting Channels

Mics must be muted by using the Dugan's **mute** buttons. Pulling a fader down on the console will not properly mute a 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.
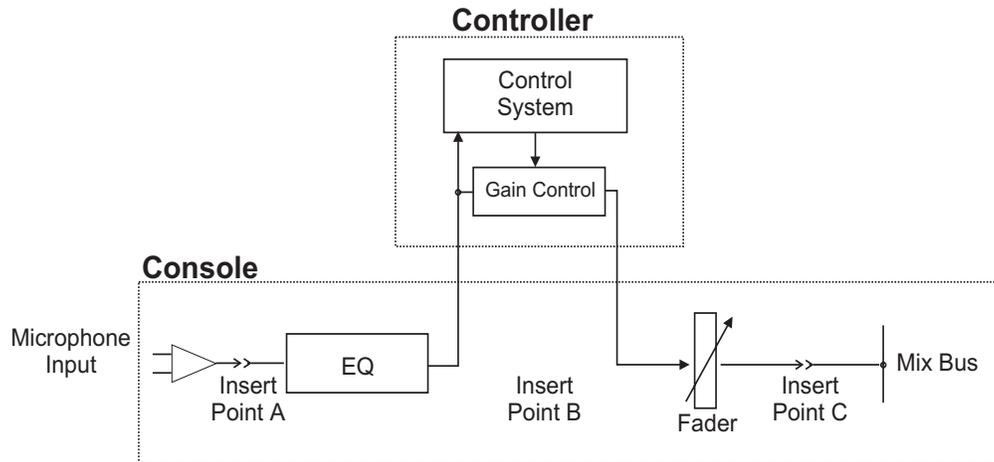
Figure 4-5 Insert points on most analog mixers are at point B

To properly mute a channel:

- Leave the console faders up, adjust levels while people are talking, and mute a mic by pressing the Dugan's **mute** mode button. Enable the mic when needed by putting it back into **auto** mode.

  Muting mics does not alter the overall ambient sound mix: the Speech System compensates by slightly raising the ambient gains of the other mics to compensate for the gain subtracted by muting a mic. Note that this behavior is during ambience without input to any mic; while one or more mics receive speech input, the gain shifts to the active mics.

  OR

- Use the **bypass** switch with the console fader pulled down. This keeps the mic instantly available on the fader but that channel is no longer in the control mix.

  Be aware that **bypass** may generate a click if it interrupts room rumble, whereas the **mute** button does a quick-fade. The **mute** button can be used with the fader up; **bypass** is best used with the fader down.

4.3.2   Pre-listening to Muted Channels

If your board 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 out of bypass and raise the fader so you will be ready to up-cut automatically.

Chapter 5: Web Control Panel

Figure 5-1 Web Control Panel

5.1   Software Installation

The Model E contains an internal web server that downloads two Java applets into the user's web browser. Download the latest Java Runtime Environment (JRE) from: http://java.sun.com/javase/downloads/index.jsp. The Model E applet requires JRE version 5 or later.

Insert the software CD supplied with the Model E or download the collection of Model E files from:

http://www.dandugan.com/downloads

OR

http://tech.groups.yahoo.com/group/duganusers/files/

We recommend copying the CD files to your hard drive.

To connect the Model E directly to a computer, use the rear panel Ethernet jack. Windows requires a crossover cable; Macs can use either a crossover or a straight cable. Use a straight Ethernet cable to connect to a network.

The Model E's factory default IP address is 192.168.0.1. Note that the subnet is 0, which keeps the Model E from interfering with other network devices, but also prevents it from being recognized by most networks. The method to change the IP address depends on whether the Model E is connected directly to a computer or to a network router/switch.

In either case, drag **Index.htm** to a web browser. If the message in Figure 5-2 is displayed, click **OK** to close the error message (if not, the IP address does not need to be changed and proceed to *Operation* on page 28).

Figure 5-2 Error message

The Network Info dialog (Figure 5-3) appears, showing the computer's **Local IP Address** at the top.
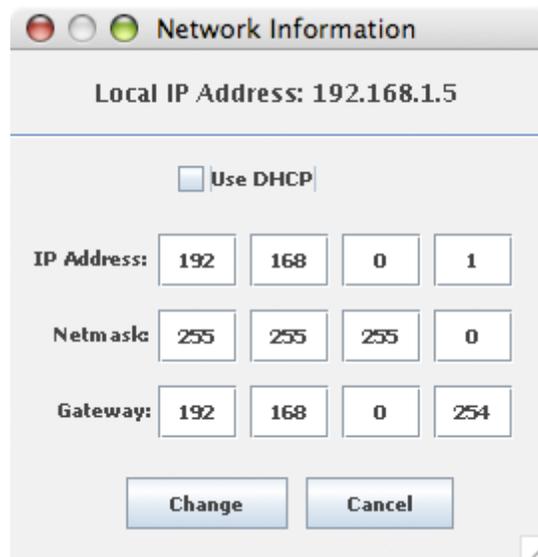
Figure 5-3 Network Information dialog

The subnet is the third group of digits in the **Local IP Address** (1 in Figure 5-3). Now follow the appropriate instructions for your connection to modify the unit's IP address.

If the unit is connected directly to the computer:

1. Choose an IP address that matches your computer's first three groups of digits and a last group that is one integer higher.

2. Click **Change**.

If the unit is connected to a switch or router:

1. Select the **Use DHCP** checkbox.

2. Click **Change**.

The unit reboots with the new IP address and appears in the left pane. If the unit does not appear in the left pane, click **Refresh**. If the display is incomplete, quit the browser entirely and relaunch it by dragging **index.htm** to the browser's icon.

For IT Experts

The Control Panel in the right pane will not work until the unit and computer belong to the same subnet. The subnet *masks* of both must also be identical. For example, if the subnet mask is 255.255.255.0 and the computer's IP address is 192.168.1.123, the Model E subnet mask must also be 255.255.255.0 and the IP address must be of the form 192.168.1.x where x is a number not already assigned to another computer or device.

With a Windows firewall, enter the Model E's address directly in the browser's address field. The unit may not show up in the list because the response to a broadcast packet is rejected by the firewall but the control panel will still work.

The Model E can be controlled over the Internet (port 9776), but only those with advanced network skills should attempt this.

5.2   Operation

Figure 5-4 Web Control Panel

The web control panel provides controls not available when using the Model E as a standalone device (See Chapter 4: *Operation* for standalone operation):

- The **auto mix weight** controls set the relative sensitivity of the automatic mix for the channels in use.

- The **manual**, **auto**, and **mute** buttons transition each channel smoothly between modes.

- The momentary master **override** button fades up the channels whose **override** function is active and fades down the other channels. The automatic mix resumes when the button is released.

- The master **preset** button sets each channel to the mode indicated by its **preset** mode LED. Powering up the system also performs this function.

Set the unused channels to the **mute** mode. Use each channel's **preset** button to set the preset mode lights to match the modes of the channels.

NOTE: *The Model E continues to perform automatic mixing if the Web Control Panel is disconnected.*

The control panel in the right pane mimics all the Speech System controls of a Model D-2 or D-3. Since the Model E has no Music System algorithm, those controls do not appear.

The Model E does not have groups. If linked with a D-series mixer, the Model E's channels are assigned to **group a**.

Since the Model E's front panel has no **man** button, Manual mode is displayed as full gain.

The channels and the unit itself can be named by entering text in the windows. Channel naming is cleared by a System Reset (see *System Reset* on page 17) and the unit's name is cleared by a Network Preset (see *Network Reset* on page 17).

As in the D-series, all settings are retained when the control panel is disconnected or powered off. When the unit powers up, channel modes are set to the **Preset** settings.

To quickly control multiple units, open a browser tab or window for each Model E.

5.2.1   Auto Mix Weight
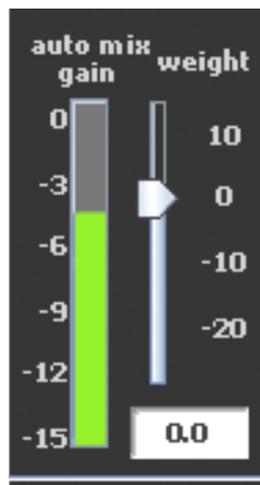
Figure 5-5 Auto mix weight control

The **auto mix weight** controls set the relative sensitivity of the automatic mix for the channels in use. When the **auto mix weight** controls are balanced, each mic has an equal opportunity to take over the system: when one person talks into one mic, he/she gets all the gain and the others get turned down.

The **weight** controls can be used to balance the channel gains when no one is talking. If a board preamp trimmer is turned down, that channel's **weight** control can be turned up to re-balance the automixing, and vice-versa. Weights can be changed by dragging the sliders or by entering dB values in the windows below the sliders.

It is important to understand that the Speech System works by detecting the *ratios* of the levels between channels, not their absolute levels. The **auto mix weight** control is not a gate threshold!

The following example explains how **auto mix weight** works (see Figure 5-6):

Raising the **auto mix weight** control for one channel (Frame 1):

• 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 **auto mix weight** setting.

It is important to understand that this does not set that mic's *level* in the mix when that person speaks alone, but only its *sensitivity* during automatic mixing compared to other channels.
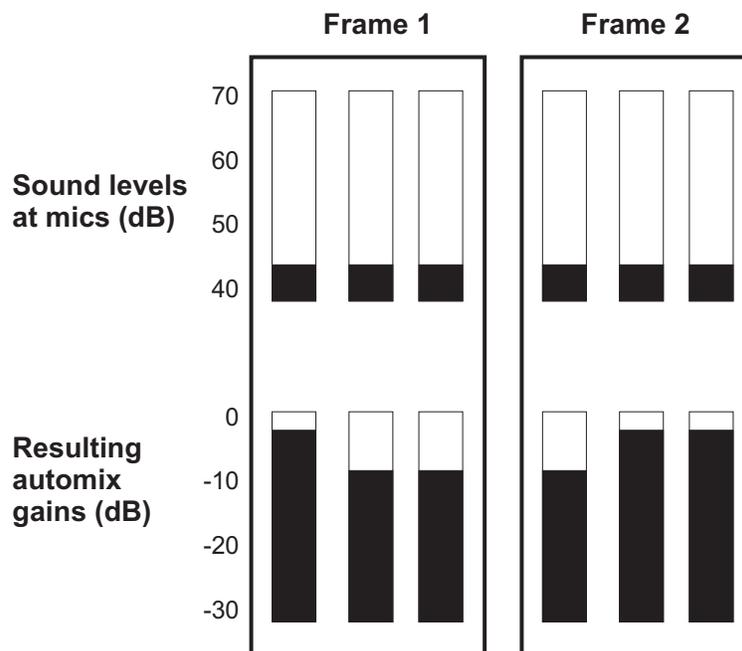
Figure 5-6 Frame 1: Raising **auto mix weight**; Frame 2: Decreasing **auto mix weight**

Lowering the **auto mix weight** control for one channel (Frame 2):

• 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 **auto mix weight** controls so the channel gains display approximately equally when no one is talking. If there is ongoing noise near one mic (i.e., computer fan or air vent), suppress it by reducing that channel's **auto mix weight**.

See Chapter 4: *Operation* for further details on automatic mixing operation.

5.2.2   Logic Functions

Override

The **override** button in the master control section fades all the channels full up or mute, depending on the states of the **override** buttons for the individual channels. Override is a momentary function, active only while the master **override** button is held down.

Select the channel(s) to include in the override group by activating their **override** button(s). These channels come up full when the master **override** button is held down; all other channels are muted.

Preset

The master **preset** button sets the modes (manual, auto, mute) of the channels to the setting shown on the **preset** LED for each channel. Use these settings to store your most commonly used pattern of channel usage, which may be restored by pressing the master **preset** button. The channels are in their preset modes when the unit is powered up.
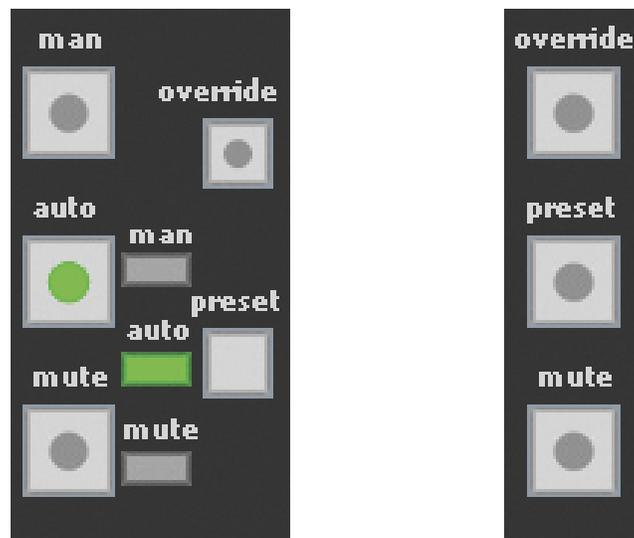
Figure 5-7 Channel (left) and Master (right) **preset** buttons

To set channel presets:

1. Click the channel **preset** button until the LED displays the desired setting.

2. For all unused channels, click the **preset** button until **mute** is selected.

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. This is also the state in which the system powers itself up.

Mute

The master **mute** button is a momentary function that rapidly fades out (0.5 s) all channels while held down.

Bypass Mode

Each channel has a bypass mode. A channel may be patched directly through the Dugan with the **bypass** switch. That channel's lights extinguish and the **bypass** LED illuminates. All analog I/O is bypassed when the power is off so it is not necessary to unpatch the Model E when not in use.

NOTE: *After all controls have been set, the Web Remote Control Panel can be disconnected. The Model E remembers all settings, even after the power is turned off.*

Chapter 6: ASCII Remote Control

6.1 Installation

The rear panel Ethernet jack can be connected directly to a computer with a crossover cable, or to a network router or switch with a straight cable.

6.2 ASCII Remote Control Commands

6.2.1 Introduction

The Model E responds to ASCII command strings to control the unit remotely with third-party control systems. Every control available on the Remote Control Panel can be accessed with command strings.

To test ASCII commands:

1. Enter the Model E's address as a target for Telnet.

2. At the prompt, enter the command strings as described below.

Two command formats are supported:

- ASCII text format extended with a binary byte at the beginning and a binary check-sum byte at the end. The check-sum enhances the reliability of the transmission.

  0xFE Command <CR> check-sum

  0xFE means an 8-bit byte with the hexadecimal value FE, 254 in decimal, 0111 1111 in binary (sent left to right).

- ASCII text format:

  Command <CR>

  This format is appropriate for quickly testing a command from a terminal. We recommend using the extended format for highest reliability.

The *Command* is a text command string (7-bit ASCII characters only). *<CR>* is the carriage return character (ASCII value 13). Each command requires a carriage return at the end of the line. We will not show this in the examples.

The second format requires two extra bytes. The first byte is 0xFE (254 in decimal) and is the only 8th-bit-set number accepted by the Model E. The second extra byte is the *check-sum* byte that is the lower 7 bits of the 8-bit sum of all the bytes from 0xFE to <CR>, inclusive.

The two formats may be mixed. Whenever 0xFE is detected, the E automatically switches to the extended format. When an extended format packet is sent, the reply is also in the extended format. All white spaces and tab characters are automatically re-moved before parsing and command strings can be in either upper or lower cases. The following characters result in the same command:

NE3,1

Ne 3, 1

n E3, 1

The Model E replies to every ASCII command. The format of the reply echoes the com-mand. For example, if **NE3,1** is sent from the user, the reply from the Model E when the command is successfully executed is: **NE3,1**

If **NE3,** is sent from the user, the reply is **NE Syntax error,** indicating a syntax error in the command (parameter value missing).

6.2.2   Commands

This section describes all the available command strings for both formats.

Each command has the form:

<command> <channel>, <value>

OR

<command> <value>

The following examples are in plain ASCII text format but also apply to the extended format. We use spaces for clarity but they are not necessary and are not present in the replies. When a channel is specified, a comma is required in the command string.

NOTE: *ASCII commands can be used simultaneously with the Web Control Panel.*

Channel Bypass

Queries or sets the channel's Bypass status (0 = No Bypass; 1 = Bypass).

Query

	Example	Meaning
Sent	BP 2	Is channel 2 Bypassed?
Reply	BP 2, 0	No Bypass on channel 2

Set

	Example	Meaning
Sent	BP 2, 1	Set channel 2 to Bypass
Reply	BP 2, 1	Channel 2 is Bypassed

Channel Mode

Use this command to query and set the mode of the given channel.
0 = Manual, 1 = Auto, 2 = Mute

Query

	Example	Meaning
Sent	CM 2	What mode is channel 2 in?
Reply	CM 2, 0	Channel 2 is in Manual mode

Set

	Example	Meaning
Sent	CM 2, 1	Set channel 2 to Auto mode
Reply	CM 2, 1	Channel 2 is in Auto mode

Channel Name

This command queries or sets the channel's name (15 character maximum).

Query

	Example	Channel	Meaning
Sent	CN 2	2	What is channel 2's name?
Reply	CN 2, speaker1	2	Channel 2's name = speaker1

Set

	Example	Channel	Meaning
Sent	CN 2, speaker1	2	Set channel 2's name = speaker1
Reply	CN 2, speaker1	2	Channel 2's name = speaker1

Channel Override

Use this command to query and set a given channel's **override** status.
0 = no override, 1 = override

Query

	Example	Channel	Meaning
Sent	CO 2	2	What is channel 2's override status?
Reply	CO 2, 0	2	Channel 2's override status is disabled

Set

	Example	Channel	Meaning
Sent	CO 2, 1	2	Activate override on channel 2
Reply	CO 2, 1	2	Channel 2 override active

Channel Preset

This command queries and sets the channel's current preset mode.
0 = manual, 1 = automatic, 2 = mute

Query

	Example	Channel	Meaning
Sent	CP 2	2	What is channel 2's preset mode?
Reply	CP 2, 1	2	Channel 2's preset mode = automatic

Set

	Example	Channel	Meaning
Sent	CP 2, 1	2	Set channel 2 to automatic mode
Reply	CP 2, 1	2	Channel 2 = automatic mode

Channel Weight

This command queries or sets the channel's **auto mix weight** in dB (maximum = 20; minimum = -100).

Query

	Example	Channel	Meaning
Sent	CW 2	2	What is channel 2's auto mix weight?
Reply	CW 2, -3	2	Channel 2's auto mix weight = -3.00 dB

Set

	Example	Channel	Meaning
Sent	CW 2, -4.55	2	Set channel 2's auto mix weight = -4.55 dB
Reply	CW 2, -4.55	2	Channel 2's auto mix weight = -4.55 dB

Unit Name

This command queries or sets the unit's name (15 character maximum).

Query

	Example	Meaning
Sent	NA	What is the unit's name?
Reply	NA Dugan2	Unit's name = Dugan2

Set

	Example	Meaning
Sent	NA Dugan2	Set unit's name = Dugan2
Reply	NA Dugan2	Channel 2's name = Dugan2

System Mute

This command queries and sets the system (master) mute that affects all channels.
1 = mute all channels, 0 = unmute all channels:

Query

	Example	Meaning
Sent	SM	What is the system mute status?
Reply	SM 1	System mute enabled

Set

	Example	Meaning
Sent	SM 0	Unmute all channels
Reply	SM 0	System mute disabled

System Override

This command queries and sets the system override status.
1 = override active for all channels, 0 = system override disabled

Query

	Example	Meaning
Sent	SO	What is the system override status?
Reply	SO 1	System override = enabled

Set

	Example	Meaning
Sent	SO 0	Disable system override
Reply	SO 0	System override = disabled

System Preset

This command sends a master (system) preset command causing all channels to go to their channel preset mode.

1 = set channel mode to preset value for all channels, 0 makes the preset button on the Web interface turn off. SP 1 should always be followed by SP 0.

	Example	Meaning
Sent	SP 1	Send a system preset command
Reply	SP OK	OK = successfully executed

Factory Preset

This command, like the System Reset command on the Web Remote Control Panel, re-sets the unit to its factory presets. The result is the same as booting up with Bypass 1 held down. This does not change the network settings or the analog/digital I/O mode. For example:

	Example	Meaning
Sent	FP	Reset factory presets
Reply	FP OK	OK = reset accomplished

DHCP Mode

Queries or sets the DHCP mode (1 = use DHCP, 0 = do not use DHCP).

Query

	Example	Meaning
Sent	DH	Is DHCP mode active?
Reply	DH 1	DHCP enabled

Set

	Example	Meaning
Sent	DH 0	Do not use DHCP mode
Reply	DH 0	DHCP disabled

IP Address

This command sets or queries the IP Address (in dot format) of the Model E.

Query

	Example	Meaning
Sent	IP	What is the Model E's current IP address?
Reply	IP 192.168.1.2	IP address = 192.168.1.2

Set

	Example	Meaning
Sent	IP 192.168.1.2	Set the IP address to 192.168.1.2
Reply	IP 192.168.1.2	IP address = 192.168.1.2

NOTE: The IP address change does not take effect until the Model E is rebooted.

Ethernet Gateway

This command sets or queries the Ethernet Gateway IP address (in dot format).

Query

	Example	Meaning
Sent	GW	What is the Ethernet Gateway's IP address?
Reply	GW 192.168.1.2	Ethernet Gateway's IP address = 192.168.1.2

Set

	Example	Meaning
Sent	IP 192.168.1.2	Set the IP address to 192.168.1.2
Reply	IP 192.168.1.2	IP address is 192.168.1.2

Network Mask

This command sets or queries the Network Mask (in dot format) of the Model E.

Query

	Example	Meaning
Sent	NM	What is the current Network Mask?
Reply	NM 255.255.255.0	Network Mask = 255.255.255.0

Set

	Example	Meaning
Sent	NM 255.255.255.0	Set the Network Mask to 255.255.255.0
Reply	NM 255.255.255.0	Network Mask = 255.255.255.0

Headroom

Returns the current headroom state. HR 0 = -10 dBU and HR 1 = +4 dBU.

	Example	**Meaning**
Sent	HR	What is the headroom state?
Reply	HR 1	Headroom = +4 dBU

Master or Slave Mode

Queries the master/slave mode of the unit (0 = Slave, 1 = Master).

	Example	**Meaning**
Sent	MM	What is the master/slave mode of the Model E?
Reply	MM 1	Model E = Master mode

Version

This command returns the microcontroller and DSP firmware versions.

	Example	**Meaning**
Sent	VE	What are the firmware versions?
Reply	VE 1.0, 1.0	microcontroller = 1.0, DSP = 1.0

Chapter 7: Firmware Updates

Program updates and other improvements, installed while the Model E is connected to a host computer, can be found at:

http://www.dandugan.com/downloads

OR

http://tech.groups.yahoo.com/group/duganusers/files/

Three types of Model E program update files are identified by their name extensions:

- microcontroller firmware – **.hex**
- DSP firmware – **.ldr**
- Web Control Panel – **.wdl**

To update your Model E:

1. Download and unpack the remote control software, **Model_E_Web_Control_Panel.zip**. See *Software Installation* on page 25 for detailed instructions.

2. Download and unpack the firmware update, **Model_E_Firmware_Update.zip**.

3. Start the remote control software by double-clicking **index.html**.

4. Browse to the control panel of the Model E to update.

   Under the Dugan logo are three lines showing the software versions. Update only those that are not up to date.

Microcontroller Firmware (.hex file)

5. Hold down the **Control** and **Alt** (**Option**) keys, and click the **Reset** button on the screen.

   A prompt appears asking for a new microcontroller firmware file.

6. Find and double-click on the new .hex file. If the unit does not reboot automatically, cycle the power off and on.

7. Click the **Refresh** button to see the new version number below the Dugan logo.

DSP Firmware (.ldr file)

8. Hold down the **Control** and **Shift** keys and click the **Reset** button on the screen.

    A prompt appears asking for a new DSP firmware file.

9. Find and double-click on the new .ldr file. If the unit does not reboot automatically, cycle the power off and on.

10. Click the **Refresh** button to see the new version number below the Dugan logo.

Web Control Panel (.wdl file)

11. Hold down the **Control**, **Shift**, and **Alt** (Option) keys, and click the **Reset** button on the screen.

    A prompt appears asking for a new web interface file.

12. Find and double-click on the new .wdl file. If the unit does not reboot automatically, cycle the power off and on.

13. Click the **Refresh** button to see the new version number below the Dugan logo.

Chapter 8: Specifications

Specifications	
Audio Inputs	unbalanced, 6 KOhm, -22 to +4 dBu nominal level, +21 dBu maximum
Audio Outputs	unbalanced, 100-Ohm source, drives a 600-Ohm load, +21 dBu maximum
Output Noise	less than -91 dBu (A-weighted); 112 dBA dynamic range
Alternative Digital I/O	ADAT optical, 48 KHz/24 bit, (8 channels only; units cannot be linked when using digital I/O)
Frequency Response	10 Hz to 22 KHz, +0/-1 dB
Crosstalk	-81 dB @ 20 KHz
Distortion	less than 0.003% THD+N at +21 dBu
Gain	unity
A/D and D/A	48 KHz/24 bit (will operate with 44.1 KHz digital I/O)
Audio Latency	0.6 ms
Linking	optical, up to 8 units (64 channels) may be linked in a ring; links with Models D-2 and D-3
Connectors	**Audio:** 1/4-in TRS; tip input, ring output **10/100 BASE T:** RJ-45 **Linking or Digital I/O**: ADAT optical **Power**: coaxial 5.5 mm o.d., 2 mm i.d.
Power	nominal 12 VDC 1.3 A maximum; accepts 9–24 VDC, either polarity, or 9–18 VAC separate power supply unit; input 120 VAC, 60 Hz, 27 W; output 12 VDC, 1.5 A; Approved UL, CUL
Dimensions	1RU **H** = 1.75 in (4.5 cm) **D** = 8.3 in (21 cm) **W** = 8.75 in (22.2 cm) adapters supplied for mounting one or two units in 1RU of 19-in rack
Weight	3.3 lb (1.5 kg) 5.0 lb (2.3 kg) in shipping box with power supply

Chapter 9: Connector Pinouts

Table 9-1 Analog I/O jacks

	Signal
Tip	Input
Ring	Output
Sleeve	Ground

Table 9-2 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