

Dan Dugan Sound Design

Models E-1 and E-1A

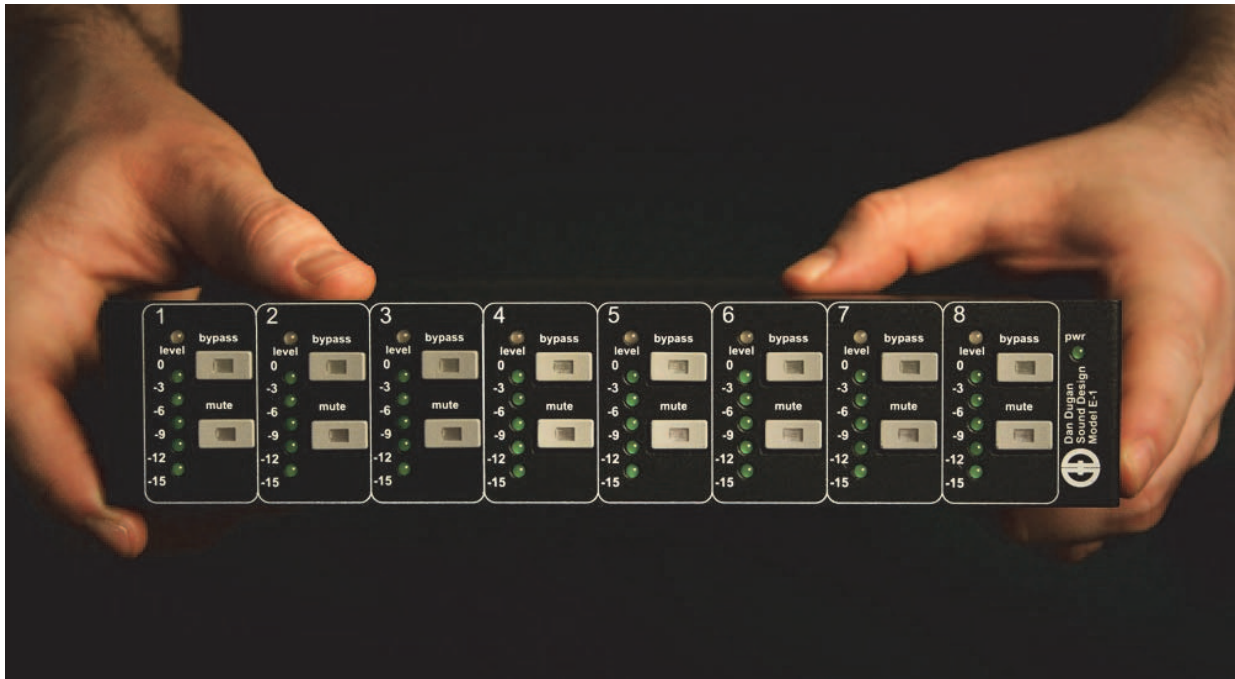
Automatic Mixing Controllers

User Guide

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Important Safety Instructions and Warnings

The Model E-1A'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-1A 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 Model E-1A Automatic Mixing Controller helps professional audio engineers handle multiple live mics without continually riding individual faders. This multi-channel audio signal processor patches into the channel insert points of a mixing console. The Model E-1 detects which mics are being used, and makes fast, transparent crossfades. This eliminates late upcuts, reduces system noise and feedback, and lets the engineer focus on balance and sound quality. The Model E-1A has both analog and digital I/O connectors.

The Model E-1A enhances a diverse group of live applications that require multiple mics:

- Conference reinforcement, video trucks
- Houses of worship
- Film and television dialogue, reality shows
- Theater
- Boardrooms, civic meetings, community TV
- Teleconferencing and distance learning

Several features expand the Model E-1A's capabilities:

- 16-channel mode (option for digital interface only)
- Dugan Control Panel software offers additional controls
- Linking allows up to eight Dugan units to work as one large automatic mixer

Theory of Operation

The Dugan Model E-1A Automatic Mixing Controller uses the Dugan Speech System™, a patented and trademarked automatic mixing function. This results in a natural one-mic ambience with minimal noise or feedback. *The Dugan Speech System does not limit, compress, or control levels.* It performs just one critical function: cuing multiple live mics in situations with unpredictable dialogue. It is essential to distinguish this behavior from the distracting fluctuation of levels and uneven ambience produced by a conventional noise gate.

When one person talks at a time, the Dugan Speech System rapidly fades that mic's gain up and the others down. When the speaker pauses, that mic fades down and the others up, so the gain of all mics sums to equal that of one mic at full gain. When the next person talks, the system fades that mic's gain up and the others down. The result sounds like passing one mic among several speakers.

When multiple people talk at once, the gain is shared among active mics. All mics sound normal when used but there is no change in ambience, noise buildup, or feedback.

While people are talking, use the console's faders to set appropriate relative levels for each mic channel. You can leave the faders up when the mics are not used because the Dugan Speech System cues the mics up when needed.

Figure 1-1 shows four snapshots of the Dugan Speech System in action with three mics.

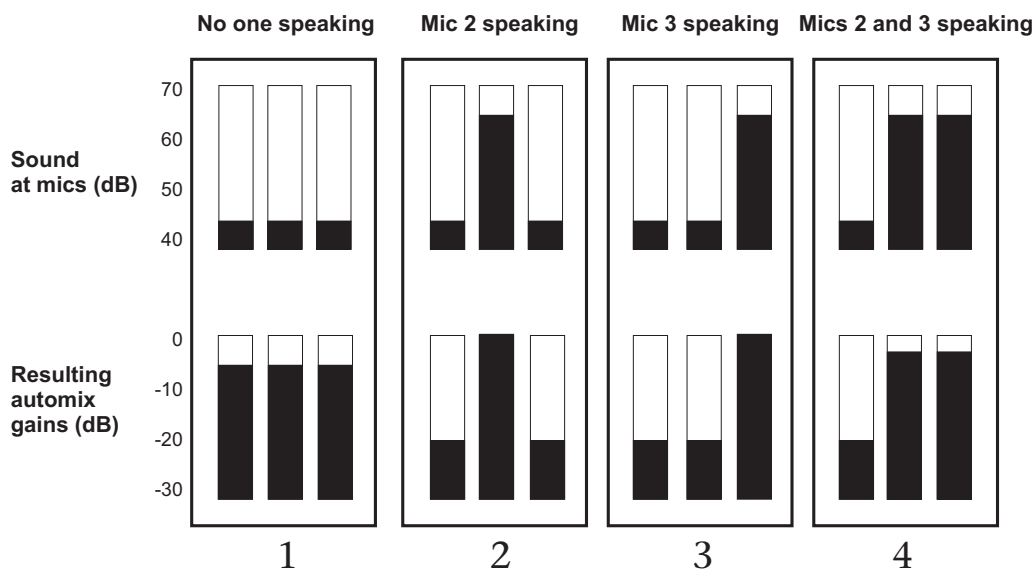


Figure 1-1 Dugan Speech System

Frame 1: No one is speaking and the sound levels at all mics are low. The system fades all channels to a medium gain that sums to one mic at full gain.

Frame 2: One person speaks alone. The system automatically fades their gain to full, and turns the other two inputs down.

Frame 3: The first person finishes speaking and a second person begins. The system automatically fades the new speaker's input gain to full, and turns the other two down.

Frame 4: Two people speak simultaneously. The system automatically shares the gain between them, and turns the other input down.

Remote Control and Software

Two Java applets are provided on a thumb drive or CD, or can be downloaded from our website:

- The Dugan Control Panel offers expanded operational capabilities (see Chapter 4: *Dugan Control Panel*).
- The Dugan Utility helps you connect to a network and update the firmware (see Chapter 6: *Updates*).

The Model E-1A can be controlled three ways:

- Front panel
- Dugan Control Panel
- ASCII commands via Ethernet (contact Dan for information)

Subscribe to the *duganusers* Yahoo group to be notified when updates are available.

Model E-1 vs. E-1A

For serial numbers 417 and above, the Model E-1 is now called Model E-1A. Model E-1s can use the latest software as described in this manual. However, only the Model E-1A provides the following additional features:

- Eight and sixteen channel modes
- Groups a, b, and c
- Input and output level meters
- Locking power connector

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-1A, make initial settings, and link units.

Connections

1. Connect the provided power supply to the Model E-1A.
2. Set the **NORM-SLAVE** switch on the rear panel to **NORM** (up) for normal (not linked) operation.

The Model E-1A can be interfaced with an analog or digital console using analog or digital connections.

Analog I/O

1. Move the I/O switch on the rear panel to the **ANALOG** (up) position.

The Model E-1A is a line-level device normally patched into the insert jacks (send and return) for each mic input channel on the board.

2. Check the insert jack wiring on your console.

If they are 1/4-in TRS jacks (wired tip = send, ring = return), use TRS-TRS insert cables to connect the Model E-1A. Other configurations require special cables. The Model E-1A is wired as follows: tip = input, ring = output.



Figure 2-1 Analog connection

Digital I/O

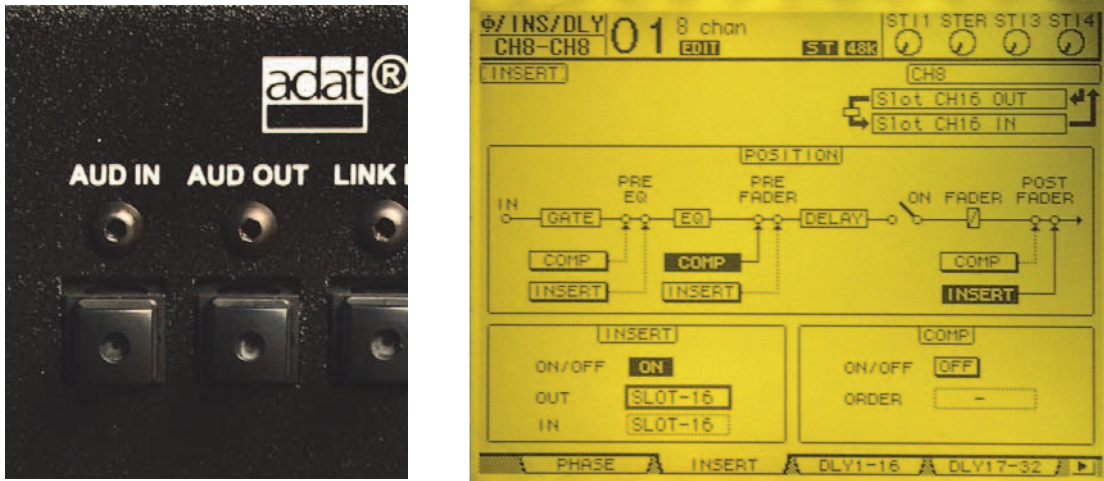


Figure 2-2 Digital audio connectors (left), typical patch in Yamaha 01V96 (right)

1. Move the I/O switch on the rear panel to the **DIGITAL** (down) position.
2. Connect the console ADAT output to the Model E-1A **AUD IN**, and the Model E-1A **AUD OUT** to the board's ADAT input.
3. Using the console's patching system, insert the ADAT inputs and outputs on each mic channel, post-fader.

The Model E-1A can now transmit and receive eight channels to and from the console.

If all **mute** buttons blink, there is no digital input signal.

NOTE: The Model E-1A (not the Model E-1) can use the **LINK IN** and **LINK OUT** connectors for eight additional automatic mixing channels.

NOTE: Due to the Model E-1A's compact size and close spacing of the ADAT connectors, some large cables may not fit. The maximum cable width is 0.48 in (12 mm).

Power-up Reset Command

The Model E-1A can execute five 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 front panel LEDs stop flashing.

The most important power-up command is Reset. See *Configuration* on page 20 to learn about the additional commands.

To execute a power-up Reset command, hold the channel 1 **bypass** button down during power-up. This sets all parameters to factory default settings and clears label text. We recommend executing a Reset command (just like “zeroing out” a console) before starting a new installation.

Linking Multiple Dugans

Up to eight Dugan units can be linked into a single automatic mixing system. One unit must be set to be the master and the others slaves.

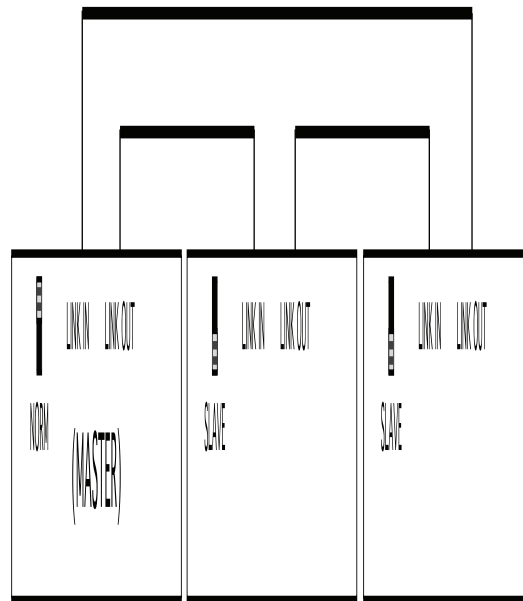


Figure 2-3 Linking multiple Dugans

1. Designate one unit as the master by setting the **NORM-SLAVE** switch on the rear panel to **NORM** (up).
2. Designate any other units as slaves by setting their **NORM-SLAVE** switches on the rear panel to **SLAVE** (down).
3. Use ADAT (Toslink) cables to link units in a ring network (see above).
Note that all **LINK IN** and **OUT** connectors are used to create the ring.

NOTE: Due to the Model E-1A's compact size and close spacing of the ADAT connectors, some large cables may not fit. The maximum cable width is 0.48 in (12 mm).

NOTE: Linked Model E-1s appear in group a only. Linked Model E-1As can use groups a-c.

Operation

1. Raise your console preamp gains until the Model E-1A'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-1A to maintain the green LED at all times.



Figure 2-4 Setting console preamp gain

2. 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**.

The **auto mix gain** meters show the channel gains resulting from the process. *They are not level meters!*

3. Adjust your console's preamp gains so all LED meters float at about the same gain when no one is talking.

Each talker now has equal access to the system gain. Note that this is not the same as adjusting for each talker's level.

4. Adjust the console faders to balance the talkers.

Don't worry about the relative positions of the faders because the automixing algorithm takes care of cueing the mics in and out.

5. If your Model E-1A is inserted to the console post-fader, you are good to go.
6. If the Model E-1A is inserted pre-fader, you must use the Model E-1A's **mute** buttons to mute mics.

With pre-fader insert patching, pulling a fader down to mute a mic leaves that mic's signal in the automixing process. This can cause the room ambience in the mix to fluctuate, or in the worst case, cut off a talker.

Chapter 3: Installation and Configuration

Installation

We recommend placing the Model E-1A in a convenient place in the operator's line of sight. A typical location is the center of the console's meter bridge.

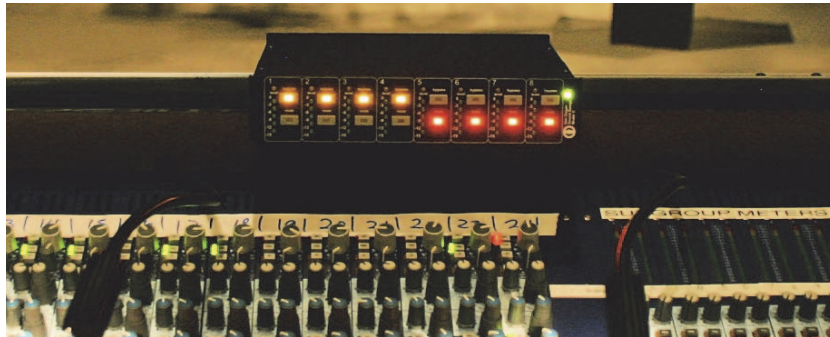


Figure 3-1 Model E-1A placed conveniently

Rack Mounting

The Models E-1 and E-1A are each half-rack in width. They can be rack mounted as a single unit or as a pair side-by-side. Each unit ships with one long and one short rack ear and one joining plate.

The rack ears for Models E-1 and E-1A are different but the joining plates are the same. Models E-1 and E-1A can be mounted side-by-side using the appropriate rack ear for each unit.

To mount one 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 rack ears to the left and right units.
6. Mount the pair in the rack.

Power Supply

Units shipped to the USA include a 12 V, 1.5 A, 120 VAC power supply. Contact the factory if you require a different power supply. In an emergency, the Model E-1A can accept power supplies within the following ranges:

- 12–24 VDC, either polarity, 1.5 A
- 9–18 VAC, 1.5 A

Audio Wiring

The ANALOG–DIGITAL switch selects which input is active, but both outputs remain active.

Analog I/O

Set the ANALOG–DIGITAL switch to ANALOG.



Figure 3-2 Analog connection

The eight channel inputs and outputs are *TRS* insert jacks. The Model E-1A receives signal on the *Tip* and sends the return from the *Ring*.

When the Model E-1A is off, the audio signal passes through unaltered, so the unit may be left patched when not in use.

The Model E-1A can be connected to the insert or line level input jacks.

Insert

1. 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-1A. Other configurations require special cables. The Model E-1A is wired as follows: tip = input, ring = output.

2. Patch the audio channels in the insert loop (send-return) of each console input strip. This is the normal way to connect the Model E-1A using a mic-level signal.

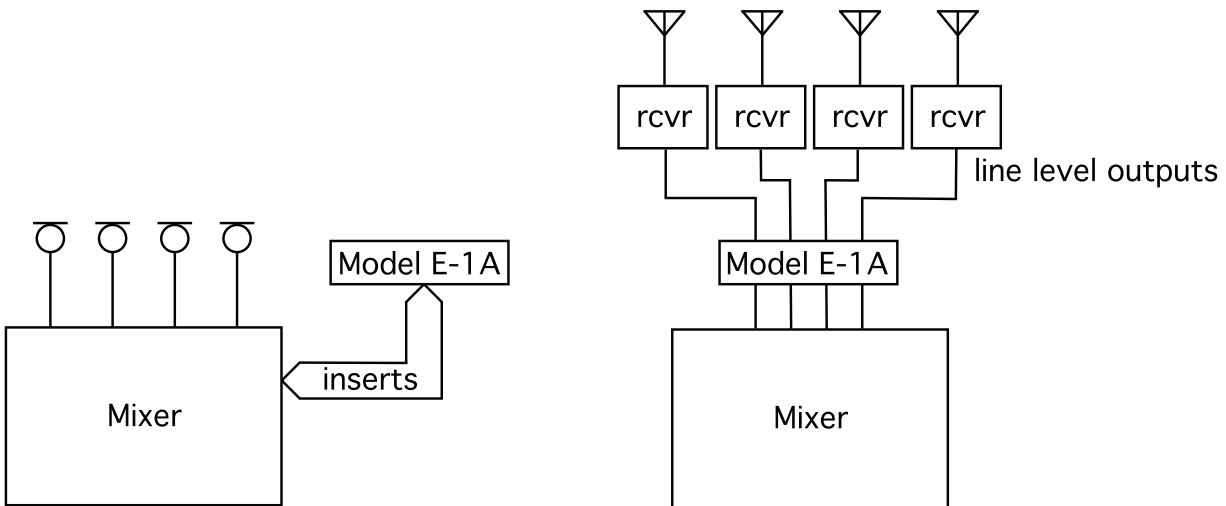


Figure 3-3 Analog insert (left) and line level (right) block diagrams

Line Level

Use split insert cables. The receiver output is wired to the tip of the TRS plug. The console's line input connector is fed from the TRS plug's ring.

Digital I/O

1. Move the **ANALOG-DIGITAL** switch to the **DIGITAL** (down) position.

This switches the input to the **DIGITAL IN** connectors. Linking is still possible and the analog outputs remain active.

2. Use two ADAT (Toslink) cables to connect the console's ADAT interface to the Model E-1A's **AUD IN** and **AUD OUT** connectors.



Figure 3-4 ADAT audio connectors

The Model E-1A has two digital operating modes:

- **8 ch:** Eight automixing channels, linking possible
- **16 ch:** Sixteen automixing channels, no linking

The **LINK IN** and **LINK OUT** connectors are reassigned as audio I/O for channels 9–16.

To set **16 ch** mode, you can use the Dugan Control Panel (see Chapter 4: *Dugan Control Panel*), or a key command during startup (see *Configuration* on page 20). Since the Model E-1A’s front panel provides only eight channels, we strongly recommend using the Dugan Control Panel to operate in **16 ch** mode.

NOTE: Due to the Model E-1A’s compact size and close spacing of the ADAT connectors, some large cables may not fit. The maximum cable width is 0.48 in (12 mm).

3. On your digital console’s patch configuration screen, patch the ADAT channels as post-fader inserts.

If all **mute** buttons blink, there is no digital input signal.

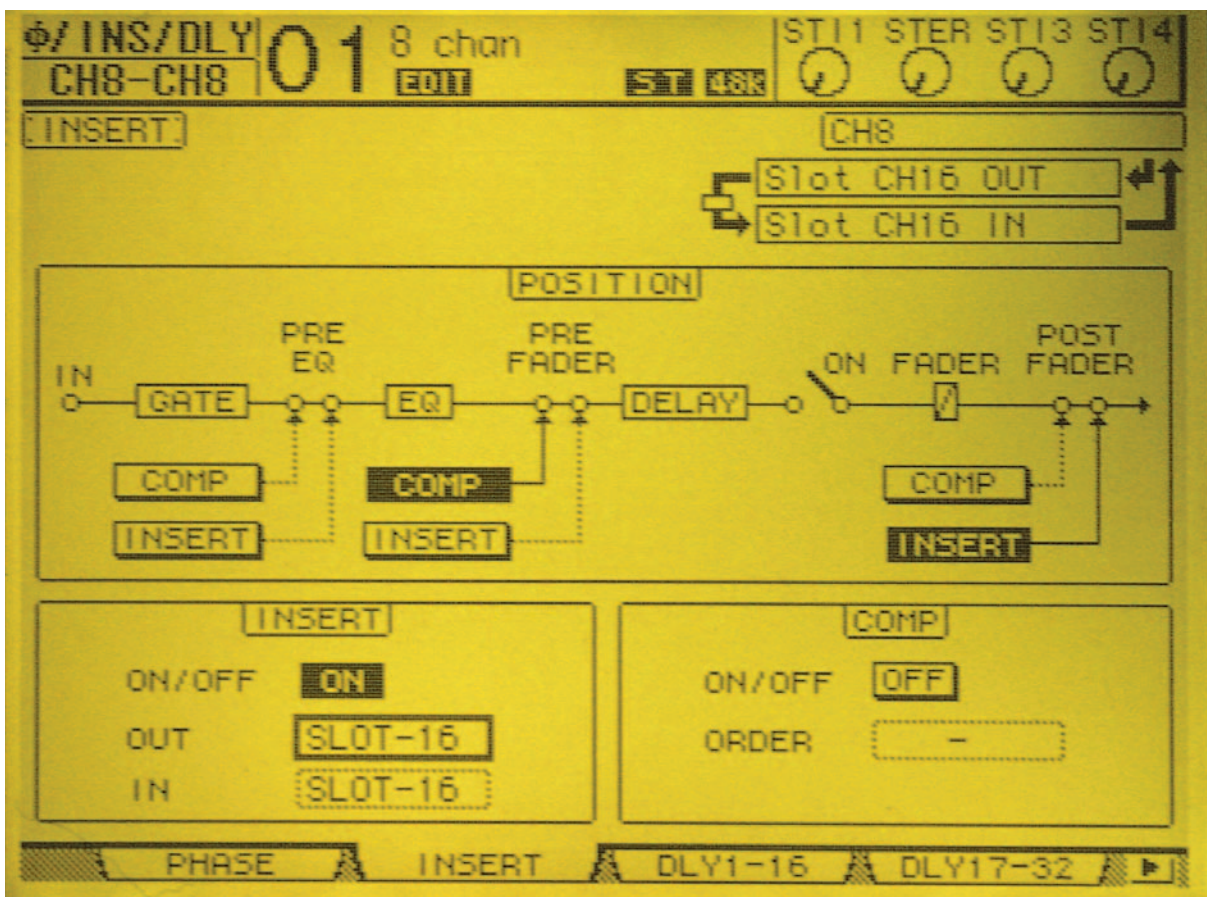


Figure 3-5 Post-fader insert example from Yamaha 01V96

Signal Levels

Analog

The Model E-1A requires line level signals in the range -20 to +4 dBm; 0 dBm is optimal. The level LEDs light green for normal operation and red for overload.

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.

Digital

Set the console input gain trimmers so program levels at the insert sends cause the level LEDs to remain green whether someone is talking or not.

Linking Multiple Dugans

Up to eight Dugan units can be linked into a single automatic mixing system. One unit must be set to be the master and the others slaves.

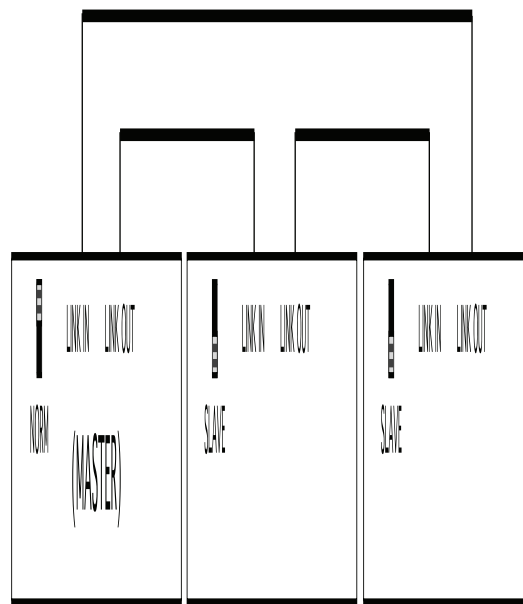


Figure 3-6 Linking multiple Dugans

1. Designate one unit as the master by setting the **NORM-SLAVE** switch on the rear panel to **NORM** (up).
2. Designate any other units as slaves by setting their **NORM-SLAVE** switches on the rear 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.

NOTE: Due to the Model E-1A's compact size and close spacing of the ADAT connectors, some large cables may not fit. The maximum cable width is 0.48 in (12 mm).

NOTE: Linked Model E-1s appear in group a only. Linked Model E-1As can use groups a-c.

Configuration

Power-up Commands

The Model E-1A can execute one of five commands during each power-up. Select the command by holding down a specific button during the entire power-up process, which takes just a few seconds. Power-up is complete after the LEDs stop flashing.

To execute more than one command, turn the unit off after it finishes powering up, and repeat for the next command.

Table 3-1 Power-up commands

	channel 1	channel 2	channel 3*	channel 4
bypass	System Reset	DHCP On	N/A	16 channel mode
mute	Network Reset	N/A	N/A	8 channel mode

*These buttons perform startup commands on the Model E, not the Model E-1A

Reset

Hold down the channel 1 **bypass** button to set all parameters to factory default settings and clear label text. We recommend executing this command (just like “zeroing out” a console) before starting a new installation.

Network Reset

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

	Model E-1	Model E-1A
IP Address	192.168.1.1	192.168.1.xx*
Netmask	255.255.255.0	255.255.255.0
Gateway	192.168.1.254	192.168.1.254
DHCP	off	off

*xx = last two digits of serial number, unless 00, then use 100

DHCP On

Turning DHCP on requests that the network assign an IP number to the Model E-1A, if the network has that capability. To turn DHCP on, hold the channel 2 **bypass** button down.

8- or 16-Channel Mode

These commands only work if the unit is in digital mode. Move the **ANALOG-DIGITAL** switch to the **DIGITAL** (down) position.

Hold down the channel 4 **bypass** button to select 16-channel mode.

Hold down the channel 4 **mute** button to select 8-channel mode.

Connecting to a Computer

Two Java applets are provided with the Model E-1A:

- The Dugan Control Panel offers expanded operational capabilities.
- The Dugan Utility helps you connect to a network and update the firmware.

Insert the USB thumb drive (or CD) supplied with the Model E-1A, or download the latest version from:

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

- OR -

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

To connect the Model E-1A directly to a computer, use the rear panel Ethernet jack. An older PC may require a crossover cable. Use a straight Ethernet cable to connect to a network.

We strongly recommend that Windows users 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, either open this port or use the workaround described in *Connecting when Windows Firewall is On* on page 27.

We recommend turning off the computer's WiFi during this process because it sometimes interferes. You can turn it back on after the connection has been established.

For those who wish to set a specific IP address, proceed to *Software Configuration for a Specific IP Address* on page 26.

Establishing Network Connections

iPad

We recommend completing your network connection with a computer before using the iPad app.

1. Launch **Dugan-Utility-yyyyymmdd.jar**.

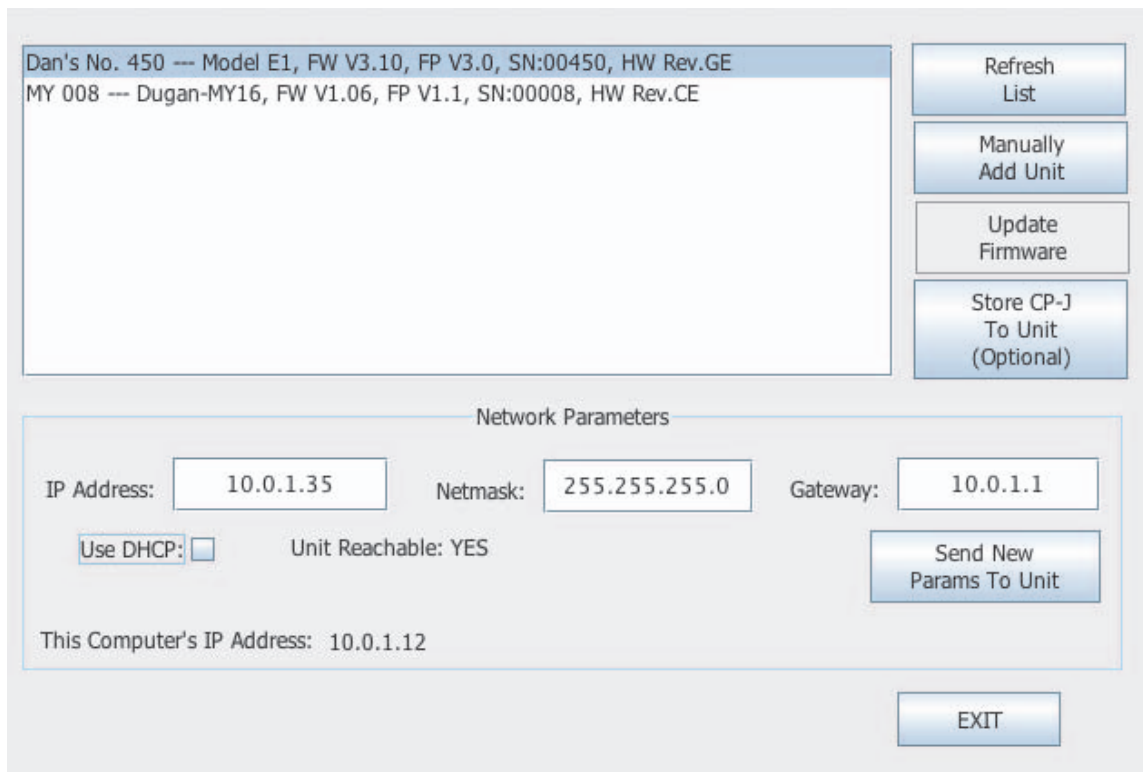


Figure 3-7 Dugan Utility

2. Wait a minute 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.
3. Click on the first unit in the list so it is highlighted.
The Network Parameters section displays information about that unit.
If **Unit Reachable** is **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 4: *Dugan Control Panel*.
If **Unit Reachable** is **NO**, proceed to the next step.
4. Power down the Model E-1A.

5. Hold down the channel 1 **mute** button during the entire power up sequence.

Power up is finished when all LEDs stop flashing.

This resets all network parameters to their factory default values.

6. Click **Refresh List**.

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

If **Unit Reachable** is **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 Step 3. If you are finished with installation, proceed to Chapter 4: *Dugan Control Panel*.

If **Unit Reachable** is **NO**, proceed to the next step.

8. Select the **Use DHCP** parameter.

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

10. Highlight the unit in the list pane again.

If **Unit Reachable** is **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 3. If you are finished with installation, proceed to Chapter 4: *Dugan Control Panel*.

If **Unit Reachable** is **NO**, proceed to the next step.

11. Copy **This Computer's IP Address** to the **IP Address** field, and increase the value in the last (fourth) group by one.

For example, if **This Computer's IP Address** is 192.168.1.101, set **IP Address** to 192.168.1.102.

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

13. Highlight the unit in the list pane again.

If **Unit Reachable** is **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 3. If you are finished with installation, proceed to Chapter 4: *Dugan Control Panel*.

If **Unit Reachable** is **NO**, see *Using the Internally Stored Dugan Control Panel* on page 25.

Manually Add Unit

If the Dugan unit does not appear in the Dugan Utility list pane, you can manually add the unit:

1. Power down the Model E-1A.
2. Hold down Channel 1's **mute** button and power up the unit.
This performs a network reset.
3. Click **Manually Add Unit**.
4. Enter the default IP address: 192.168.1.xx
xx = last two digits of serial number, unless they are 00, in which case enter 100.
5. Click OK to exit the dialog.
6. Click **Refresh List**.

If the list pane is still blank, see *Using the Internally Stored Dugan Control Panel* on page 25.

Using the Internally Stored Dugan Control Panel

Normally, the Dugan Control Panel is run from the **Dugan-Control-Panel-vxxx.jar** file. However, if for any reason you do not have that file or an Internet connection, you can run the Dugan Control Panel from a copy stored in the unit (see Chapter 6: *Updates*).

iPad

It is not currently possible to run the internally stored Dugan Control Panel from an iPad.

To run the internally stored Dugan Control Panel:

1. Launch your browser.
2. Enter the IP Address of the unit.
If you do not know the IP Address, see *Network Reset* to set it to a known address.
3. Since the Top Pane will be empty, open a separate browser tab for each unit you wish to operate and enter its IP Address.

If this does not work, consult the *duganusers* Yahoo group (<http://tech.groups.yahoo.com/group/duganusers>) or contact Dan.

Software Configuration for a Specific IP Address

This section explains to users with IT expertise how to set a specific IP address for any Dugan unit on the network.

1. Launch **Dugan-Utility-vxx.jar**.

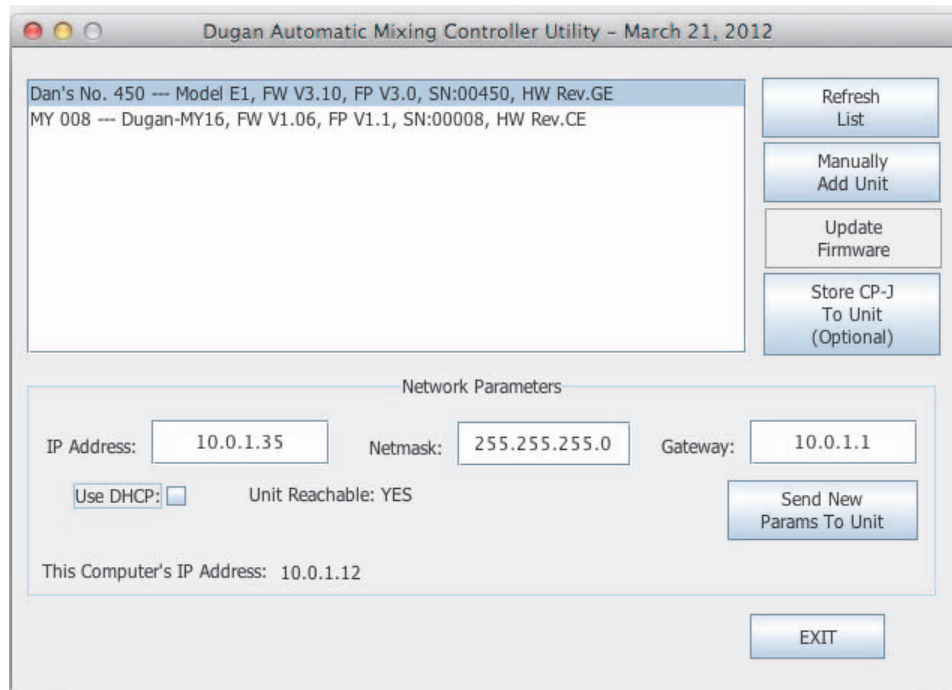


Figure 3-8 Dugan Utility

2. Wait a minute 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-1A will reboot.

Connecting when Windows Firewall is On

The Windows Firewall blocks access to port 9776 that is used by the Dugan software. If you must leave the Windows Firewall on, you can operate the Dugan Control Panel in a browser window with one connected unit per tab.

1. Enter the Model E-1A's IP address directly in the browser's address field.
The browser uses the Dugan Control Panel that is stored in the Model E-1A's hardware, not the version that you may have downloaded to your computer.

The unit will not show up in the top pane but the control panel will still work.

2. If you have multiple Dugan units, create a browser tab for each one and enter its IP Address.
3. Switch tabs to control different units.

Chapter 4: Dugan Control Panel

The Dugan Control Panel has both Java and iPad versions. This chapter discusses the Java version and notes the iPad app's few differences.

The Dugan Control Panel provides additional controls not available from the hardware front panel:

- Channel **weight** control
- Channel manual mode
- Unit and channel naming
- Preset function to recall favorite settings
- Override function to solo a mic
- Master mute function

The Model E-1A (serial number 417 and above) has these additional features:

- Eight and sixteen channel modes
- Groups a, b, and c
- Input and output level meters



Figure 4-1 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>

- OR -

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

If you do not have an Internet connection, you can use the version of the Dugan Control Panel stored inside the unit's firmware. See *Using the Internally Stored Dugan Control Panel* on page 25.

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

The Dugan Control Panel is divided into three panes:

Top Pane	icons for all connected Dugan units
Channel Pane	man, auto, mute, preset, override, group, weight, bypass , and channel name controls
Master Pane	OVERRIDE, PRESET, MUTE, meters, system , and reset controls

The Top Pane

The Top Pane displays all connected Dugan units. The active unit is enclosed by a yellow rectangle. Click on another unit to select it and deselect the previous unit.



Figure 4-2 Top Pane

If all connected units do not appear in the top pane, see *Establishing Network Connections*. 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.

Setting Controls and Naming Units/Channels

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 (touch and hold on iPad).

Naming Units and Channels

Connected units are displayed in the top pane in alphabetical order. To display them in your own order, use names with number prefixes.

To name a unit and its channels:

1. Select a unit in the top pane.
2. Select the yellow text in the right 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 is cleared by pressing **reset** (see page 40).

When the unit is powered up, channel modes are determined by their preset modes; all other settings are retained.

After configuring settings with the Dugan Control Panel, it can be disconnected. All settings are retained and the unit continues to function on its own.

Channel Pane

The Channel Pane contains the controls and indicators for each channel. Channels are always in one of three modes: **man**, **auto**, or **mute**. The active channel mode illuminates. All transitions are made with a smooth, rapid fade. Select a channel mode by pressing the individual mode buttons or the Master **PRESET** button.

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

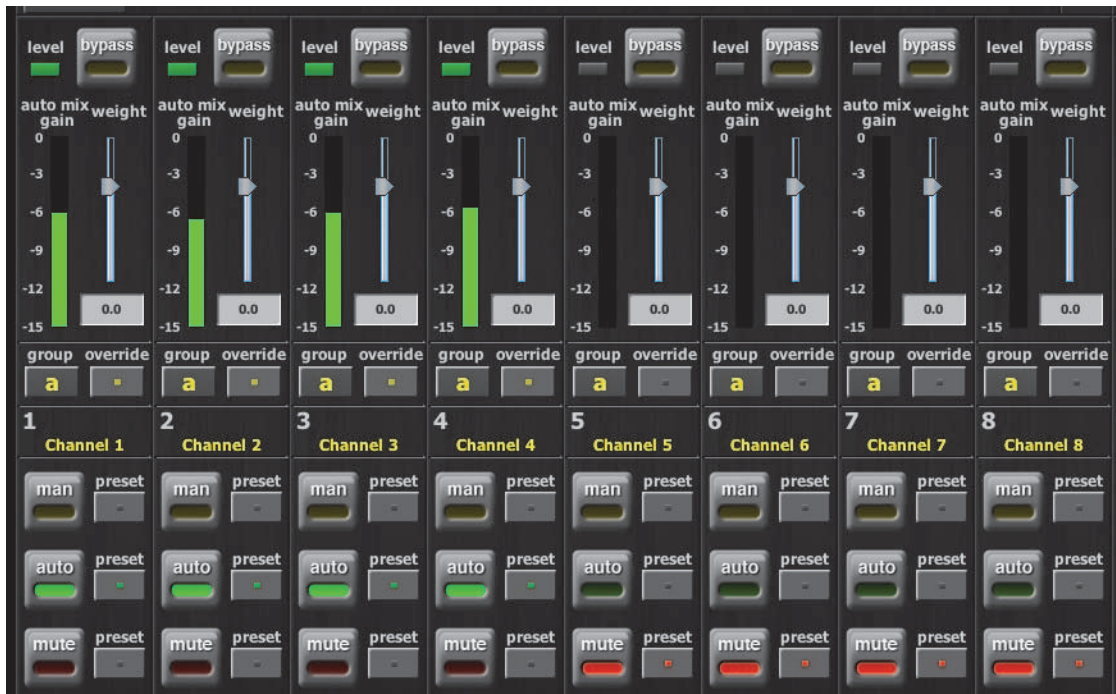


Figure 4-3 Channel Pane

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 level LED lights red, lower the console's channel input gain until it stays green at all times.

Bypass

When **bypass** is active, the signal passes through without automixing. That channel appears inactive, with all lights extinguished.

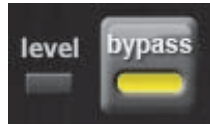


Figure 4-4 **bypass** button lit

Since all analog I/O is bypassed when the power is off, it is not necessary to unpatch the Model E-1A when not in use.

If you are using analog I/O, **bypass** mode physically connects the input to the output with a relay. Channels are automatically bypassed when the power is off. In **man** mode, the signal undergoes an A/D and D/A conversion, with the specified latency, but no automixing.

Man and **bypass** modes are the same except for the transition. **Bypass** is instantaneous, which can cause an audible click, while **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 4-5 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.

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.

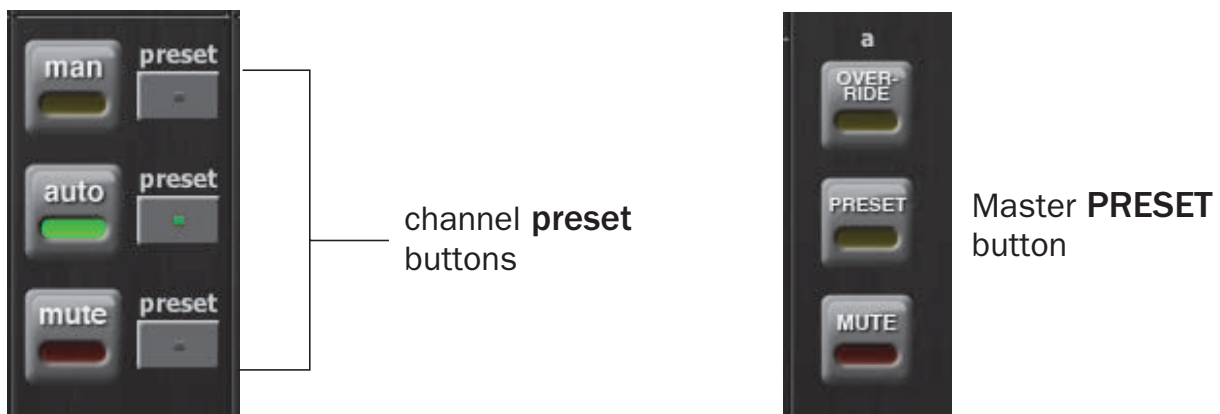


Figure 4-6 Channel **preset** (left) and Master **PRESET** (right) buttons

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.

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 4-7). A set of **OVERRIDE**, **PRESET**, and **MUTE** buttons appears in the Master Pane for each group.



Figure 4-7 Channel 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.

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.

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

Table 4-1 Meter modes

The default meter display is **auto mix gain**. This is the most useful choice during normal operation; the input and output meters are only used when setting or checking levels.

Click on the Master **meters** button to toggle 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. *They do not change the mix levels.* When the **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 **auto mix gain** and the others get turned down.

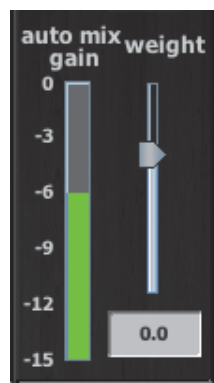


Figure 4-8 Weight controls

The **weight** controls should be used to balance the channel **auto mix gain** indicators 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. Ctrl-click the **weight** slider to reset its value to 0.

iPad

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

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

The following example explains how **weight** works (see Figure 4-9).

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.

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.

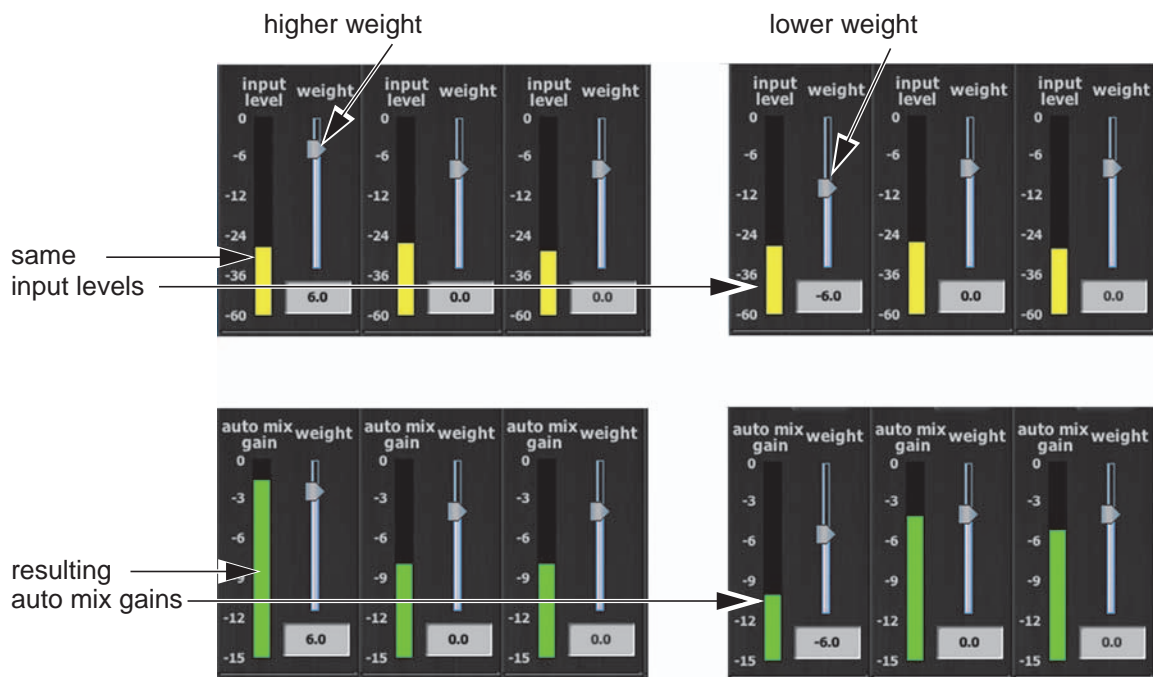


Figure 4-9 Changing one channel's weight control

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. 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.

Figure 4-10 shows eight- and four-mic systems with appropriate auto mix gain displays when no one is talking.

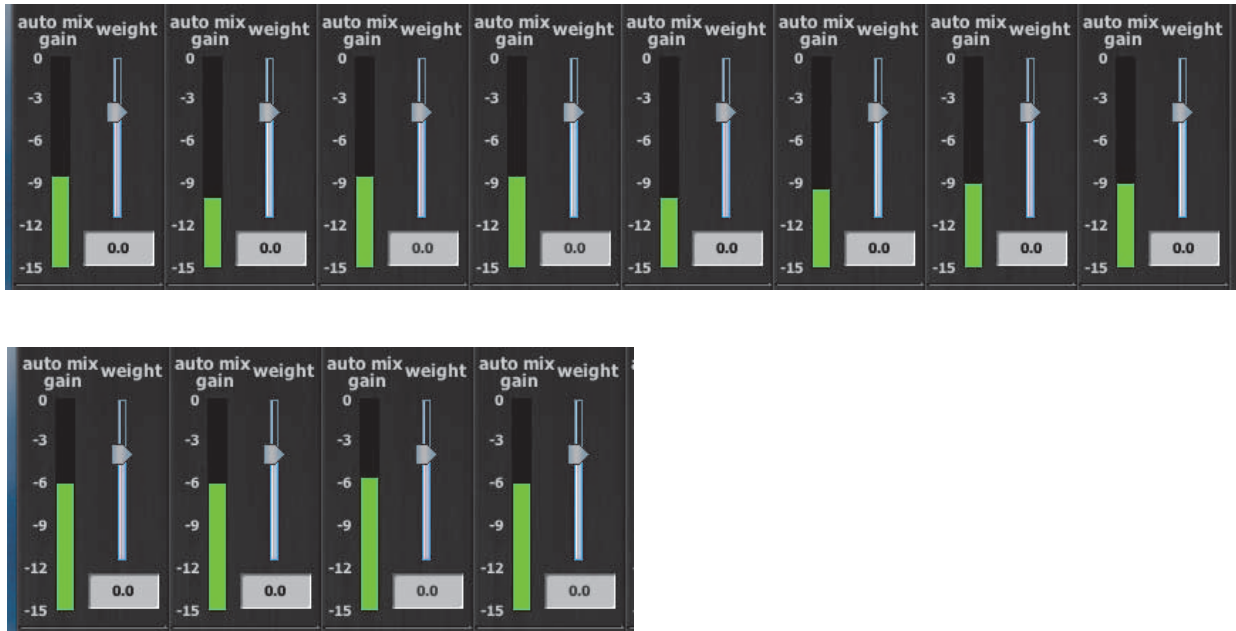


Figure 4-10 Multiple mic ambience: auto mix gain hovers around -9 dB for eight mics, -6 dB for four mics

Master Pane

The content of the Master Pane changes to reflect the Dugan device selected. This section documents the Model E-1A's controls and indicators.

The selected unit's firmware and Control Panel (Java or iPad) versions are shown below the Dugan logo.

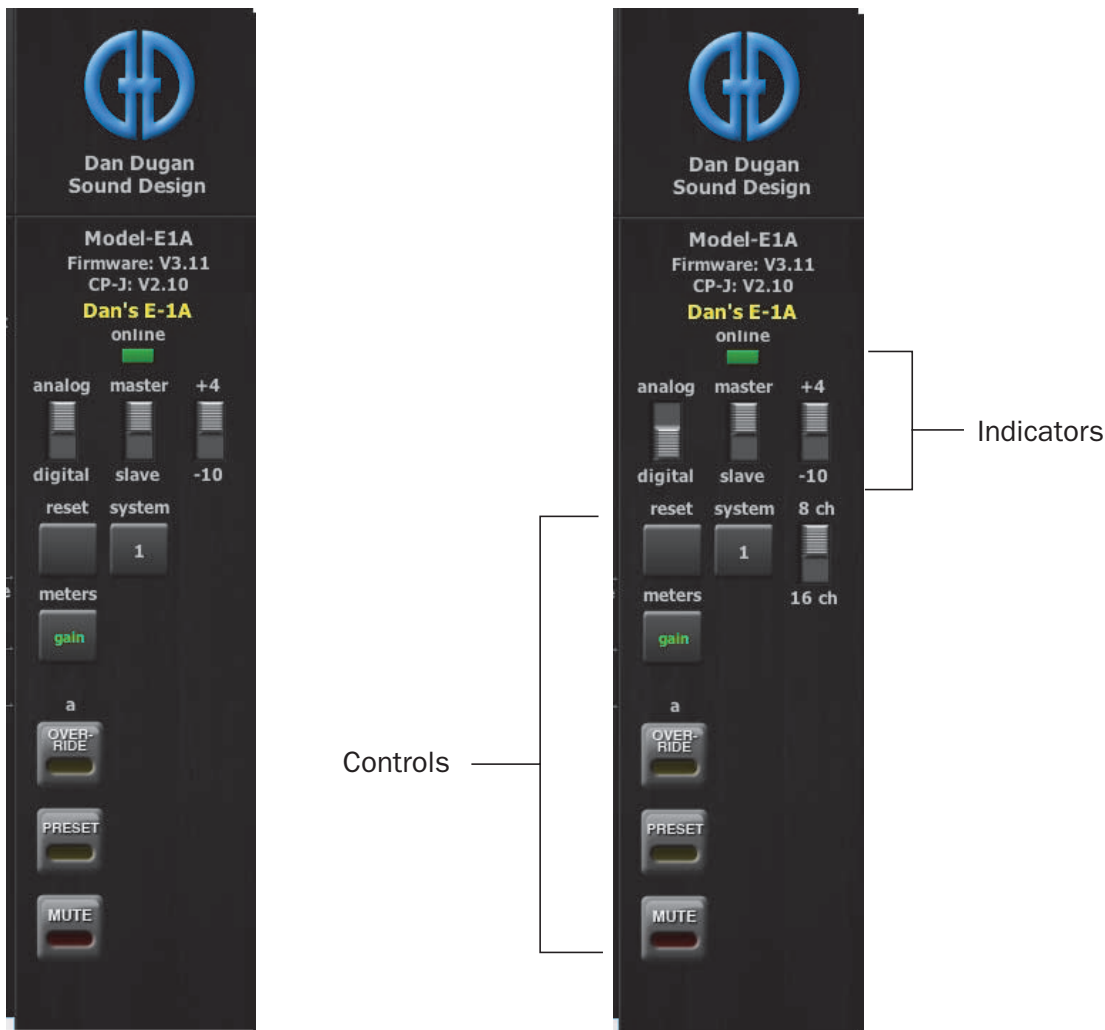


Figure 4-11 Analog (left) and digital (right) Master Panes

Indicators

The Master indicators include **online**, **master/slave**, **analog/digital**, and **+4/-10**. The **online** indicator lights when the unit is connected to the Dugan Control Panel. The three switch indicators mirror the settings of the three rear panel switches (see *Configuration on page 20*).

Controls

The Master controls, located on the far right, include **reset**, **system**, **meters**, **OVERRIDE**, **PRESET**, and **MUTE**. A set of buttons appears for each active group.

Reset

Press the **reset** button to restore the unit to its default settings.

System

When multiple Dugan *units* are linked, groups a, b, and c span linked units and operate as independent automatic mixers.

It is possible to have multiple *systems* of linked units on your network. These units will all appear in the top pane. The Model E-1A allows 16 systems in a network.

In the rare instance that requires 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.

Eight or Sixteen Channel Mode

When the Model E-1A is set for digital I/O, the **8-16 Ch** switch appears in the Master section. Set the switch to the desired mode. In **16 Ch** mode, the rear panel **LINK** connectors are used for audio I/O for channels 9–16 instead of linking.

Meters

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

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

Table 4-2 Meter modes

Group Master Modes

A set of group master mode buttons appears in the Master Pane 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.

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

Pressing 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

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

Chapter 5: Standalone Hardware Operation

The Dugan Control Panel software provides the complete complement of controls for the Model E-1A. However, if for any reason you cannot or do not wish to connect the Dugan Control Panel, you can operate the hardware as a standalone device.

The limitations in standalone operation are:

- Eight channels
- No access to channel **weight** controls, **man** mode, **preset** function, **override** function
- No unit or channel naming
- No access to groups, input/output level meters, or Master **MUTE**

Settings

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.



Figure 5-1 Channel displays and controls

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-1A 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-1A'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.

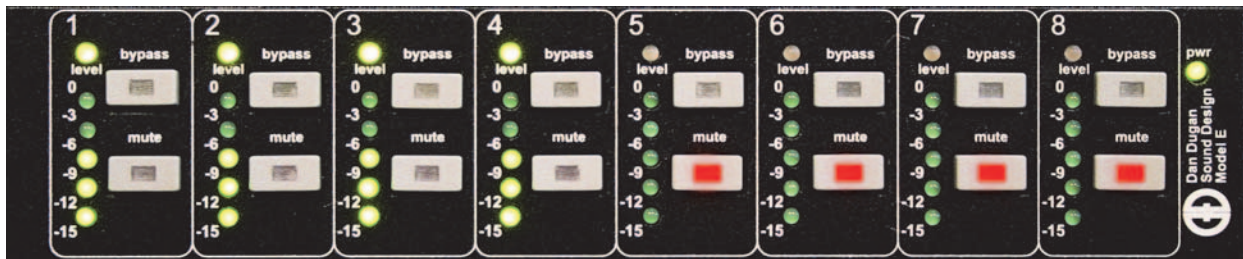


Figure 5-2 During ambience with 4 mics, auto mix gain displays should hover around -6 dB

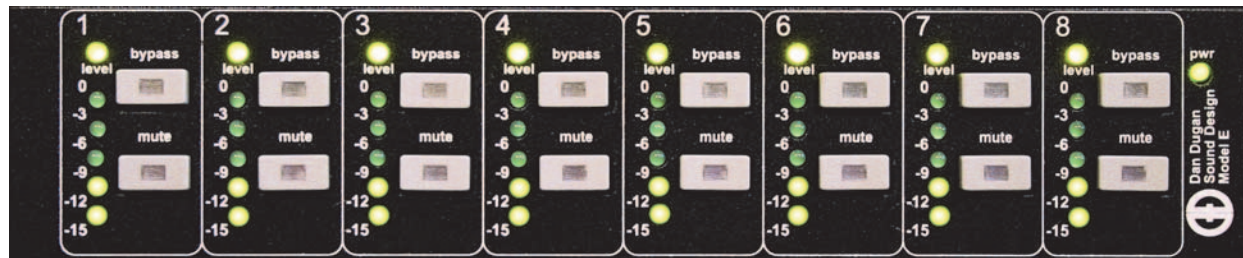


Figure 5-3 During ambience with 8 mics, auto mix gain displays should hover around -9 dB

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

Muting Channels on a Pre-fader Insert

The Dugan Speech System works best if inserted post-fader. If your console has only pre-fader inserts, this section describes how to properly mute channels and pre-listen to muted channels. If your console allows post-fader inserts, skip this section.

To mute a mic using a pre-fader insert, use the Dugan's **mute** buttons. Pulling a console fader down does 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 cuts off a speaker.

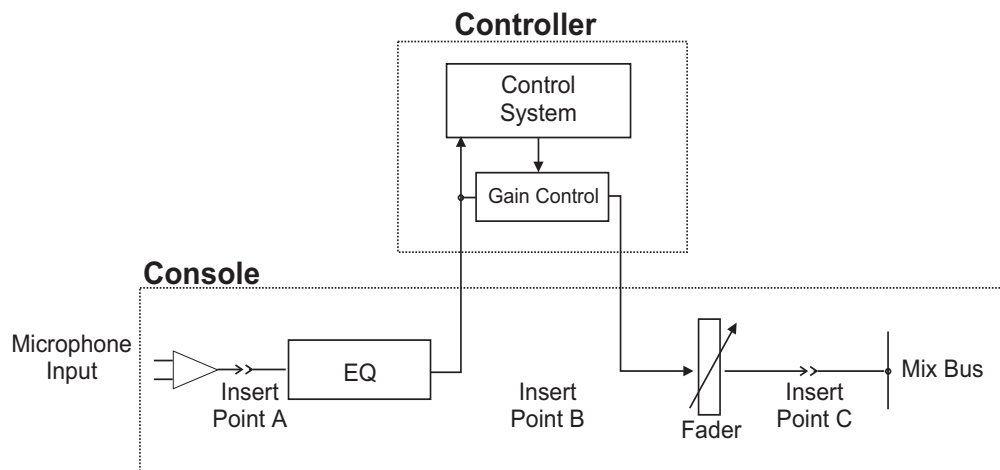


Figure 5-4 Insert points on most analog consoles are at point B

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 deactivating the **mute** button.

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.

Pre-listening to Muted Channels Using a Post-fader Insert

If signal through the Dugan is required to pre-listen to a mic, pull the fader down and put that Dugan 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 6: Updates

Updates for the Model E-1/E-1A can be downloaded.

iPad

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

To update the Dugan Control Panel for iPad, connect 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/>

- OR -

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

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 the safety copy of the Dugan Control Panel that loads automatically into the unit.

To revert to a previous version, use the older 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.

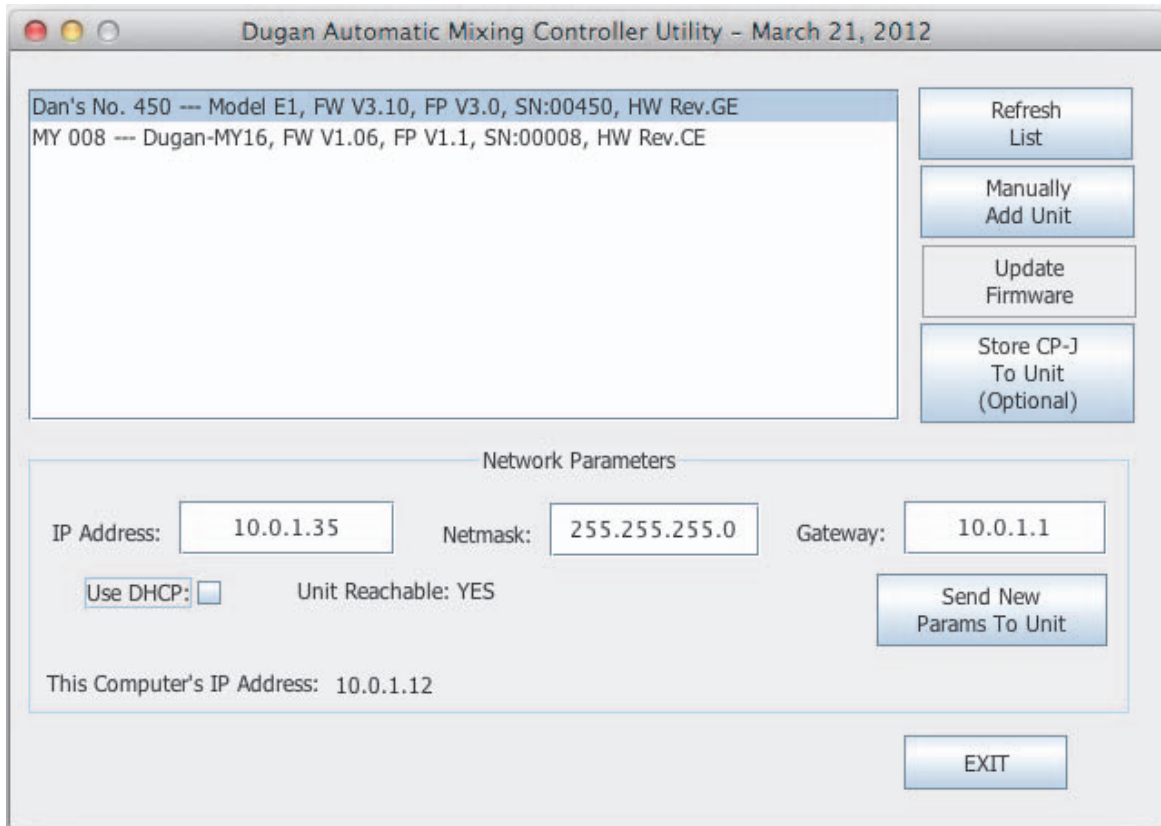


Figure 6-1 Dugan Utility

If you do not see the Dugan unit(s) on your network in the list, see *Establishing Network Connections* on page 17.

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. Click on **Send New Params To Unit**.
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: Specifications

Analog Audio Inputs (8 Ch)	unbalanced, 6 k Ω , -22 to +4 dBu nominal level, +21 dBu maximum quiet room sound level: higher than -50 dBu in +4 mode, -62 dBu in -10 mode
Analog Audio Outputs (8 Ch)	unbalanced, 100- Ω source, drives a 600- Ω load, +21 dBu maximum
Output Noise	less than -91 dBu (A-weighted); 112 dBA dynamic range
Digital I/O (8 or 16 Ch)	ADAT optical, 48 kHz/24 bit (will operate with 44.1 kHz digital I/O) nominal average level: -20 dBFS quiet room sound level: higher than -75 dBFS
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
Optical Linking	up to 8 Dugan units may be linked in a ring network
Connectors	Audio: 1/4-in TRS; tip input, ring output 10/100 BASE T: RJ-45 Linking and Digital I/O: ADAT optical Power: coaxial 5.5 mm o.d., 2 mm i.d.
Power	12 VDC (nominal) 1.3 A maximum: accepts 12–24 VDC, either polarity, or 9–18 VAC Separate power supply unit: input 120 VAC, 60 Hz, 27 W; output 12 VDC, 1.5 A UL, CUL Approved
Dimensions	H = 1.75 in (4.5 cm) D = 8.30 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	3.4 lb (1.5 kg) 7.0 lb (3.2 kg) in shipping box with power supply

Appendix B: Connector Pinouts

Table 2-1 Analog I/O jacks

Part	Signal
Tip	Input
Ring	Output
Sleeve	Ground

Table 2-2 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

