CEQ™ 280

computer controlled midi graphic equalizer

ARCHITECHTURAL ACOUSTICS®

operation manual

PEAVEY®

Intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

Intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

CAUTION: Risk of electrical shock – DO NOT OPEN!
CAUTION: To reduce the risk of electric shock, do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

WARNING: To prevent electrical shock or fire hazard, do not expose this appliance to rain or moisture. Before using this appliance, read the operating guide for further warnings.

Contents

1.0 INTRODUCTION

Thank-you for purchasing the Peavey CEQ-280™. The new CEQ-280, ⅓ octave graphic equalizer, moves into the next generation of sound reinforcement products with features that expand upon the capabilities of the critically acclaimed, MIDI programmable Peavey CEQ-28.

The CEQ-280 still makes it easy for anyone to equalize a sound system with ⅓ octave precision. The built-in Real-Time Analyzer and pink noise source let the CEQ-280 quickly and automatically equalize a sound system to a stored "target" frequency response curve. The feedback finder can then be used to find and remove the remaining feedback problems.

When used as a house equalizer for a band, the CEQ-280 offers significant advantages. Once a band has established its "sound" (house frequency response curve), the CEQ-280 can automatically adjust itself to obtain that sound in each new venue, and the CEQ-280 has enough storage locations for the busiest band.

When used in a studio setting, the CEQ-280 allows many curves to be stored and compared to find the perfect EQ. And, because the CEQ-280 changes quietly from one curve to the next, EQ curves can be changed in the middle of a song.

When changing a guitar effect or keyboard voice, a MIDI program change command sent to the CEQ-280 will recall a corresponding EQ curve, an obvious advantage in live instrument applications. For sequenced songs, program changes can be written into the sequence to change the EQ settings.

When used in permanent installations, the CEQ-280 not only makes setup a breeze, but its security lock will protect the setting from "accidental changes."

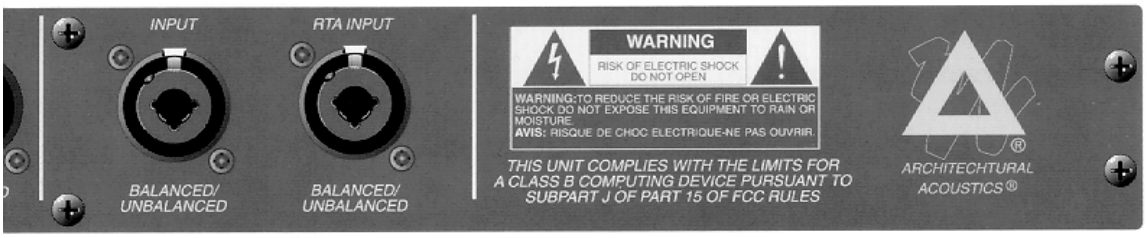
2.0 FEATURES

- 28 Band Graphic Equalizer
- Constant EQ Filters on ⅓ Octave ISO Centers
- Real-Time Analyzer
- Automatic Room Equalization
- Built in Pink Noise Source
- Easy to Read 40 x 2 Character Display
- Non-volatile Storage of 128 EQ Curves
- Non-destructive EQ Curve Addition
- EQ Curve Compare - ±12 dB in 1 dB steps - ±6 dB in 0.5 dB steps
- Combination XLR - ¼" Phone Input Connectors
- Electronically Balanced Inputs and Outputs
- Software Security Lock
- Feedback Finder
- MIDI Controllable
- MIDI-compatible with the Original Peavey CEQ®-28/CEQ™-28R
- Relay Front-Panel and Power Off Bypass
- Switchable 40 Hz Subsonic Filter
- Single I.U. Standard Rack Space

3.0 FRONT PANEL

1. **EQ**
   Access manual Equalization functions including: EQ adjustment, EQ curve compare, set EQ flat, add a curve, and EQ curve with RTA display of the EQ output signal.
2. **RTA**
   Access to mic input, Real-Time Analyzer, and auto-equalization functions including: RTA display, mic input level adjustment, microphone compensation curve selection, microphone curve creation, room response 'target' curve selection, room response 'target' curve creation, and discrete and continuous auto-equalization. To get to all of these functions, you need to press the RTA button twice.
3. **Bypass**
   Toggles between equalizer active or hardware bypass of input to output.
4. **Global**
   This provides access to: EQ range, subsonic filter, view angle, CEQ-28R/CEQ-280R control, security lock access status, and MIDI functions.
5. **Store**
   Storage and naming of EQ curves.
6. **Recall**
   Access to recall of stored curves.
7. **Cursor Buttons (Up, Down, Left and Right)**
   The *left* and *right arrow buttons* move the cursor within the current display to select a parameter for viewing or change. The *up* and *down arrow buttons* change the selected parameter as indicated by the blinking "*" or "_" cursor.
8. **Soft buttons**
   The functions of these buttons are defined in the left side of the display.
9. **Display Window**
   40 character by 2 line Liquid Crystal Display (LCD) with variable view angle adjustment for easy visibility.

9



2 1

4.0 BACK PANEL

1. **RTA microphone or line level input.**
   The XLR type mic input provides 12 volts to phantom power the recommended AVR™-1 microphone. The ¼″ phone line input can be used balanced with a tip-ring-sleeve (Stereo) plug or unbalanced with a tip-sleeve (Mono) plug.
2. **EQ Input**
   This is the main equalizer input for the CEQ-280 and can be connected balanced or unbalanced using either XLR type connectors or ¼″ phone plugs.
3. **EQ Output XLR**
   Balanced equalizer output. The XLR and ¼″ jacks are wired in parallel.
4. **EQ Output ¼″ phone**
   Unbalanced with a tip-sleeve (Mono) plug or balanced with a tip-ring-sleeve (Stereo) plug. The XLR and ¼″ jacks are wired in Parallel
5. **Noise Source Output**
   Pink noise output for room analysis. Unbalanced with a tip-sleeve (Mono) plug or balanced with a tip-ring-sleeve (Stereo) plug.
6. **MIDI In**
   This is a standard 5-pin DIN jack used for receiving MIDI data from the sending unit.
7. **MIDI Out**
   This is a standard 5-pin DIN jack used for sending MIDI data from the CEQ-280 to receiving unit(s). This jack can also echo incoming MIDI data received at the MIDI In jack. This means the receiving unit(s) will receive an exact copy of the data the CEQ-280 received. This is an option that may be turned off and on in the MIDI section of the Global menus.
8. **Power Jack**
   Use only the 16-16.5 Volt, 1A, AC power adapter provided. (Peavey part #00710160)

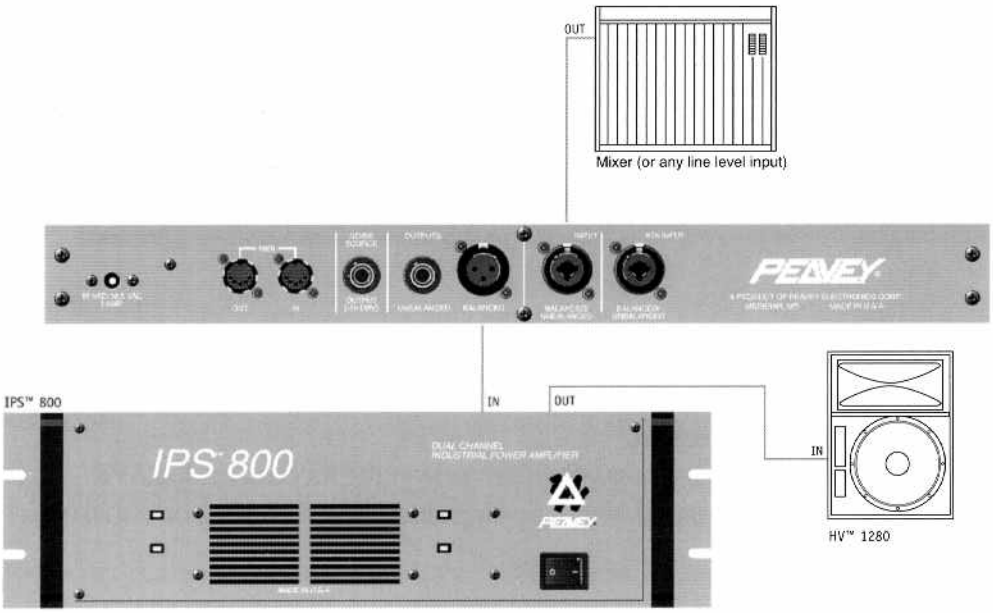
Caution: Use only the Peavey 16-16.5 volt power supply provided with this product. If the original power supply must be replaced, consult your Peavey dealer or the factory for the correct replacement. Failure to use the correct power supply could result in fire, shock hazard, extensive circuit damage, decreased performance, or non-operation.

5.0 BASIC CONNECTIONS

This sections shows some possible configurations for the CEQ-280.

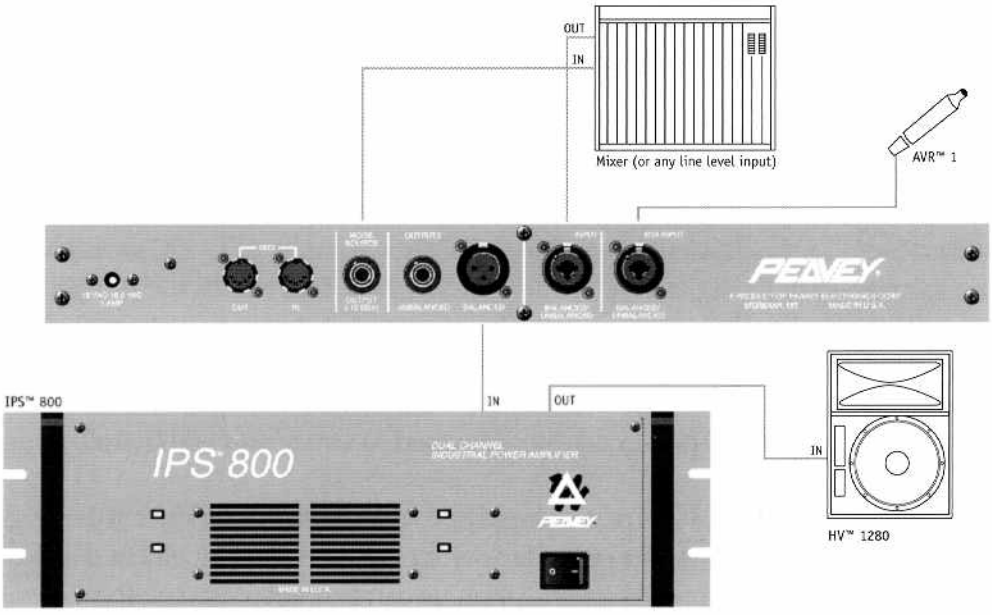
5.1 Connecting the CEQ-280 to Your Existing Sound System

This diagram shows how to connect the CEQ-280 and your sound system together.



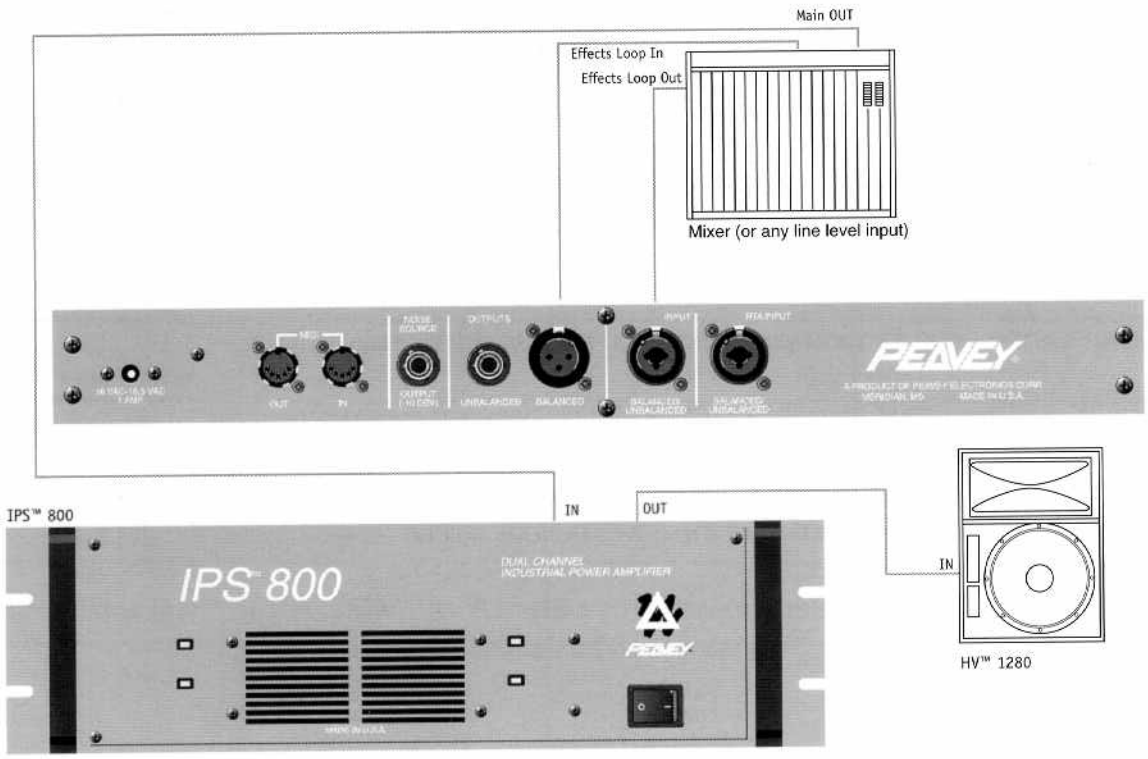
5.2 Connecting for Pink Noise

The following diagram shows how to connect the CEQ-280 into your sound system to use the pink noise source for equalization.



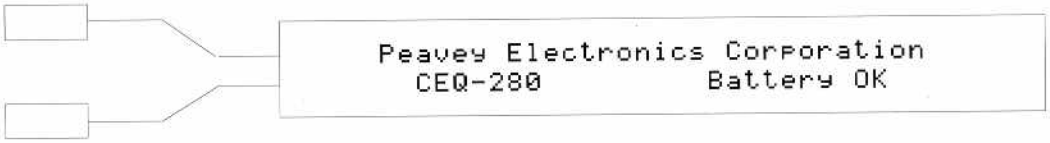
5.3 Connecting to a Mixer Effects Loop

This diagram shows how to connect the CEQ-280 to the effects loop of a recording console.



6.0 BASIC OPERATION

When the CEQ-280 is first turned on, the following display is briefly shown:



After a brief pause the screen will change to the EQ display.

Note: The EQ display is the main display for the CEQ-280. Pressing the ***EQ*** button or repeatedly pressing the EXIT soft button will always return you to this display.

This section covers the following areas:

- Parameter selection and adjustment (arrow buttons and soft buttons)
- View angle adjustment
- Manual equalization
- Storing EQ curves

- Recalling EQ curves
- Automatic equalization
- Feedback finder

Note: This section should provide all the information necessary to use the CEQ-280 in most setups. However, greater depth into this units' functions can be found in the *Advanced Operations* section.

6.1 Selecting and Editing Parameters

This manual takes the approach that the best way to learn how to operate the CEQ-280 is through example. The following section will show you how to adjust the view angle, and in the process you will learn how to select parameters and how to change their settings.

This basic process is the same for most parameters you need to select and/or change.

1. The *left* and *right arrow* buttons will always move you between parameters while....
2. ...the *up* and *down arrow* buttons will always change the value of the selected parameter.
3. Throughout this manual you will see references to 'soft buttons.' These are the two buttons located immediately to the left of the display. The function of these two buttons will be defined within the display.

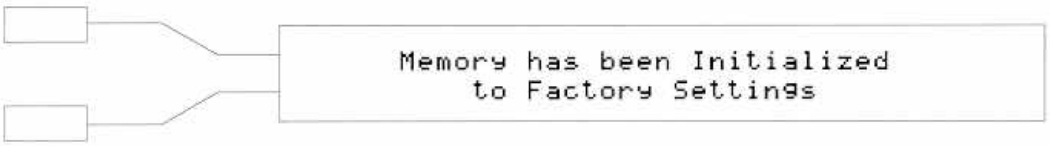
Note: The currently selected parameter is indicated by either a '*' or '_' symbol. The '*' will appear alongside a selected parameter while the '_' will appear under the parameter (or its value).

6.2 Memory Re-initialization

Re-initialization of memory returns the CEQ-280 to its original factory settings. This operation also clears the EQ curve storage memory causing all stored curves to be lost. If you have curves you wish to save, they can be dumped via MIDI to a storage device such as the Peavey MIDI Streamer™ or to another CEQ-280.

To re-initialize memory:

1. Disconnect power from the CEQ-280
2. Press and hold the **EQ** and **GLOBAL** buttons.
3. Re-apply power to the CEQ-280. The following display will appear:



6.3 Adjusting the View Angle

The CEQ-280 is equipped with a 40 character by 2 line LCD with an adjustable view angle for easy visibility. To adjust the view angle:

1. Press the **Global** button. You should see the following display:

2. If the '*' is not alongside the word "ASSIGN," use the arrow buttons to move it until it is. Then, press the soft button to the left of the word "NEXT." This will allow you to adjust the parameters found in this menu:

3. Using the *left* or *right arrow button*, move the '*' until it is alongside the words" VIEW ANGLE." The number to the right of the words "VIEW ANGLE" is the current setting.
4. Use the *up* and *down arrow buttons* to adjust the view angle. The view angle has eight adjustment settings (0-7).
5. When you have finished adjusting the view angle, press the "EXIT" soft button to return to the Global selection page. Pressing the "EXIT" soft button a second time will return you to the EQ display. You can also press the ***EQ*** button to get to the EQ page.

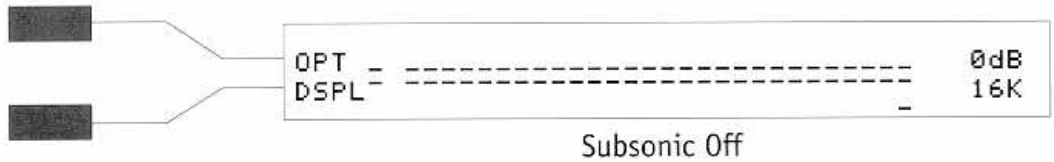
6.4 Subsonic Filter

Most sound reinforcement speaker systems do not have a usable response below 40 Hz. Amplifying signals below this frequency wastes amplifier power and risks damage to the speaker system. The CEQ-280 has a built-in, 40 Hz, low-cut filter that reduces the amplitude of these signals. The subsonic filter is generally left on for most sound reinforcement applications.

To change the subsonic filter:

1. Press the **Global** button and select "ASSIGN."
2. Move the cursor next to "SUB" and use the *up* and *down arrow buttons* to turn the filter ON or OFF.

When the subsonic filter is ON, the 32 Hz and 40 Hz bands are removed from the EQ display. This prevents these bands from being boosted and also indicates whether the filter is ON or OFF.



Subsonic Off

Subsonic On

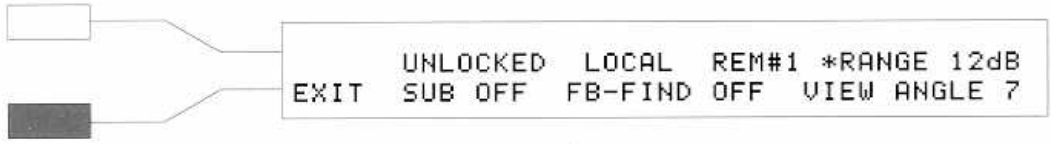
6.5 EQ Range

The CEQ-280 EQ can be set up to operate in ±6 dB or ±12 dB mode. In the ±6 dB mode the EQ adjustment is made in 0.5 dB steps, in the ±12 dB mode the EQ adjustment is made in 1 dB steps.

To change the EQ range:

1. Press the **Global** button.

2. If necessary, use the *left* or *right arrow* button to position the cursor alongside the word "ASSIGN."
3. Press the "NEXT" soft button.



4. Use the *up* or *down arrow* button to toggle between '6dB' and '12dB.'

6.6 Manual Equalization

From the main EQ display it is possible, and sometimes even desirable, to manually adjust the equalizer. The following is how the main EQ display looks when the equalizer is set to flat:

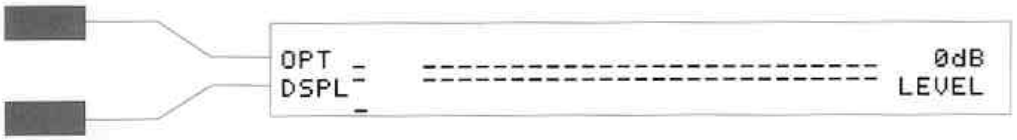
To change the settings:

1. Using the *left* and *right arrow buttons*, move the cursor until it is positioned under the frequency (or the level) you want to change. The frequency of the selected band and its boost or cut setting is shown at the right side of the display.
2. Using the *up* and *down arrow buttons*, change the boost or cut of the selected band.
3. Repeat steps 1 and 2 until all the changes are made and your system has the sound desired. Then, store the EQ curve you created.

Note: Double bars in the display indicate that the frequency band selected is set to 0 dB.

6.7 Level Adjustment

The level control is available in each of the EQ displays allowing the signal gain through the CEQ-280 to be adjusted ±12 dB. This control is used to return the CEQ-280 to unity gain after the equalizer has been adjusted. To adjust the level, move the cursor all the way to the left of the EQ display.



The goal is to adjust the level of the signal passing through the CEQ-280 so it is the same when the CEQ-280 EQ is bypassed or in use.

6.8 Bypass the EQ

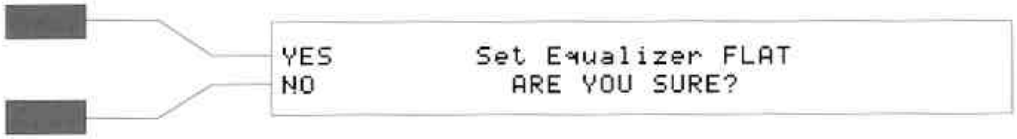
The bypass button activates a relay that directly connects the input and output jacks to provide a complete bypass of the CEQ-280 equalizer. When bypassed, "EQUALIZER BYPASSED" appears in the display. The CEQ-280 can still be adjusted by pressing any of the function buttons. After about 20 seconds, the "EQUALIZER BYPASSED" display will return if a button is not pressed.

6.9 Set EQ Flat

Sometimes you may want to set the CEQ-280's EQ flat. To do this-

1. From the main EQ display, press the "DSPL" soft button until the following display appears:

2. Pressing the "FLAT" soft button causes the following display to appear:



3. Press the "YES" soft button to complete the operation. If a unique unstored EQ curve is lost by setting the EQ flat, the curve can be still be restored by recalling curve 129. This is considered the "last EQ" and is available until another EQ curve replaces it.

6.10 Storing EQ Curves

There are 128 available program locations to store your EQ curves.

To store an EQ curve:

1.Press the ***Store*** button. You should see the following display:

2. Select the **Program** location (001-128) where the curve created is to be saved.
3. Using the *left* or *right arrow button*, move the cursor alongside 'Name.....' Use the *up* and *down arrow* buttons to change the characters and form the program name. A program name may be up to eight characters.

4. Press the "STORE" soft button. You should briefly see the following display:

The CEQ-280 will then return the main EQ display.

6.11 Recalling EQ Curves

Recalling EQ curves is easy.

To recall a curve:

1. Press the **Recall** button. You should see the following display:

2. Use the *up* and *down arrow* buttons to select the program number to recall.
3. Press the "Recall" soft button. The following display will appear briefly:

The CEQ-280 will stay on the Recall display until the "EXIT" soft button or another system button is pressed.

Note: It is also possible to add a second curve to the one selected to get the combined response of the curves. For detailed information see section 7.4.

It is also possible to recall a "flat" curve. Simply select an unused preset and press the "RECALL" soft button. The 128 program presets are initialized as flat curves at the factory. Recalling a "flat" curve via MIDI is an easy way to provide a "MIDI Bypass."

6.12 Recall the Last EQ

Whenever a curve that has not been saved is about to be destroyed, that curve is automatically stored as curve 129 'last EQ.' The recall function can then be used to restore curve 129. It is best to recall and save this curve as soon as possible because curve 129 will be overwritten the next time this situation arises.

6.13 Compare EQ Curves

It is possible to compare two EQ curves to see which might best serve your needs. To do this:

1. Press the **EQ** button (if not already on the main EQ display screen) to return to the main EQ display screen.
2. Press the "OPT" soft button.
3. On the screen that comes up, press the "NEXT" soft button. This takes you to the compare screen:

4. This screen allows you to compare the current EQ setting to a previously stored setting. To do this, press either the *up* or *down arrow* buttons until the program number/name you want to compare the current setting to is displayed.
5. Press the "NEXT" soft button. This will show the EQ curve of the program number you selected. Pressing the soft button alongside the program number will switch to the current EQ curve setting. You can switch back and forth by continuing to press the top soft button.

It is also possible to adjust the current EQ settings when the current EQ is displayed.

6.14 Automatic Equalization

6.14a Brief overview

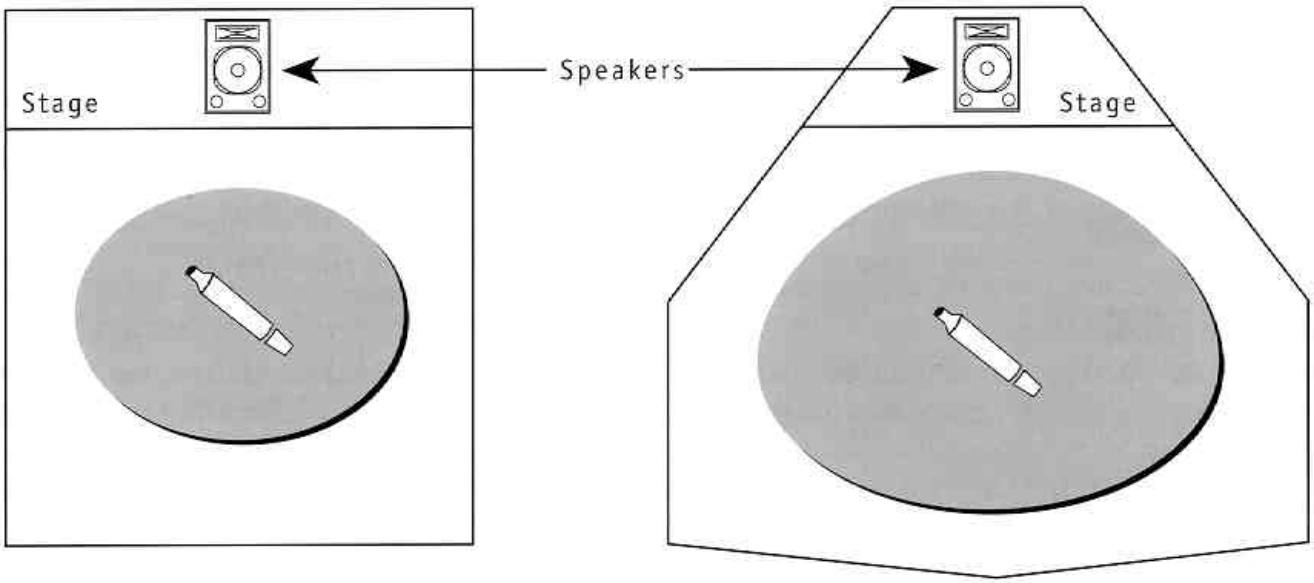
The CEQ-280 provides you with a built-in real-time analyzer (RTA) and a built-in pink noise source for auto-equalization of your room. By using the built-in pink noise source, the frequency response of the sound system can be determined. Since pink noise has an equal loudness in each of the ⅓ octave bands, a flat frequency response should show in the RTA display as a straight line.

Because high frequency sound is attenuated more by air than lows and mids, we seldom want to equalize a sound-reinforcement system flat. We generally want a gentle high frequency roll off in the system response, when measured in the middle of the seating area.

6.14b To auto equalize your sound system

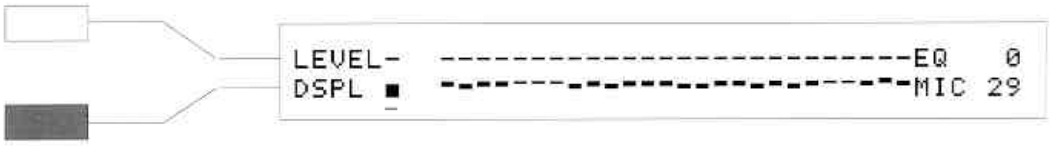
(Warning: This procedure takes longer to describe than it takes to do. After the first couple of times, you will be a doing it like a pro.)

1. Turn on the system mics to their normal operating level. Be sure to avoid feedback.
2. Connect the pink noise source, labeled Noise Source on the rear of the CEQ-280, to a mixer input. Set the EQ flat on that input or if possible turn off the EQ on that channel.
3. Connect a Peavey AVR 1 microphone on a long cord to the RTA microphone input.
4. Place the microphone ⅓ to ½ half the way back from the speakers near the center of the room at ear level.

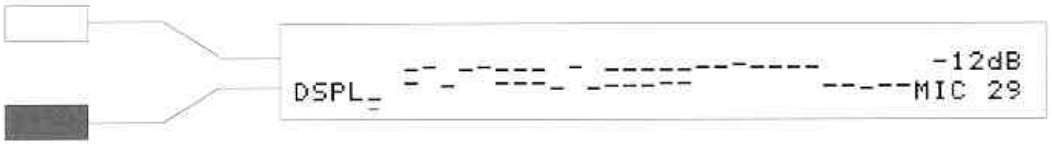


The 'gray area' in each example represents the optimum microphone placement area. This area should yield the best auto-equalization results when used in the following manner: In each room example, take 3-6 samples in various places within the 'gray area.' For best results, make sure the microphone is placed at ear level. Notice that the 'gray area' remains in or near the center of the room regardless of the room shape.

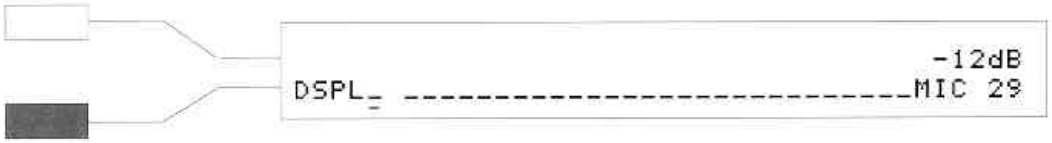
5. Press the **RTA** button on the CEQ-280.



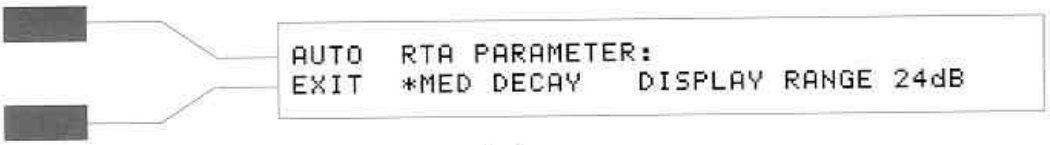
6. Turn up the pink noise to a moderate listening level.
7. Press the "DSPL" soft button so the full height RTA appears.



8. Move the cursor all the way to the left and adjust the mic volume so the RTA shows activity in the middle of the display. (The frequency bands from about 125 Hz to 1.25 kHz should be about half way up or around 0 dB.) This setting is not critical, so anywhere close will do. Turn off the noise momentarily. (If you turn off the noise by turning down the volume, be sure to note the position of the control so you can return it to the same place.) Now, look at that RTA display. If the display is not all the way to the bottom, the pink noise must be increased in volume so that the background noise of the room does not affect the measurement.

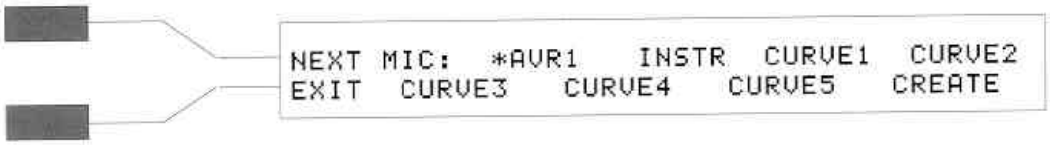


9. Turn the pink noise back on and press the **RTA** button again. The following display will appear:

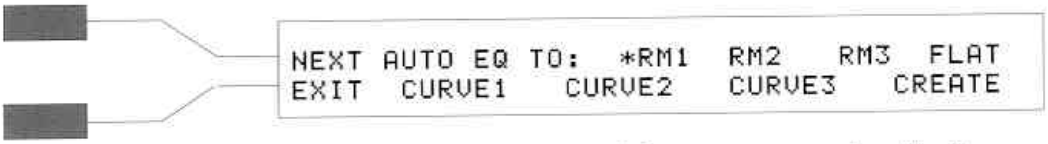


The parameters in this display will be set automatically later.

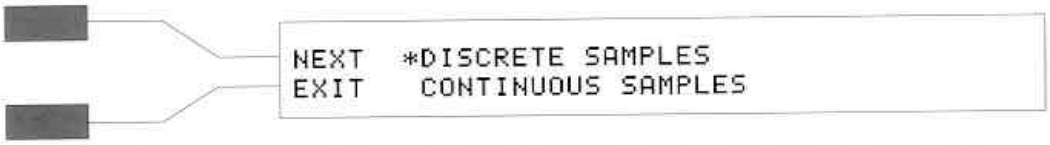
10. Press the "AUTO" soft button and the following display will appear:



11. Move the cursor next to "AVR1," if it is not already there.
12. Press the "NEXT" soft button and the following display will appear:



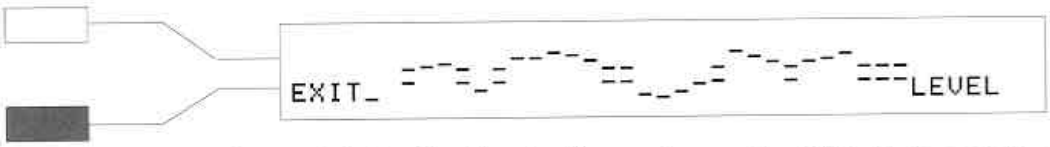
13. Select either "RM1" or "RM2" as the target response curve. (These curves are described in greater detail later in the manual.)
14. Press the "NEXT" soft button and the following display will appear:



15. Select discrete samples, then press the "NEXT" soft button. The following display will appear:

16. Press the "START" soft button to start taking the first sample.

The display should now look something like this:



For approximately 1 ¼ minutes the CEQ-280 will adjust itself to try the get the RTA display on the screen to look like the target response curve you selected.

When it has completed the sample, the start sample 02 display will appear. Move the microphone to another location in the room, and press the "START" soft button to take the next sample.

After taking 3 to 6 samples, press the EQ button to look at the resulting EQ curve. The auto equalization process is now complete. The curve you see was created by averaging the curve from each sample. *Before doing anything else, store this curve.*

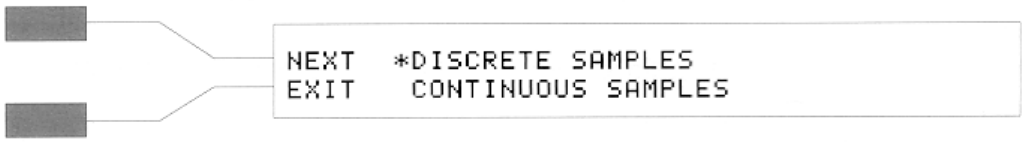
Look at the curve for bands that have a lot of boost. If the lows are boosted quite a bit, you may want to reduce them some. (The detailed auto EQ section later in the manual describes how you can customize the target response curve to avoid this problem.)

After doing this a few times, you should be able to do it quite quickly. This is best done when there are few people around. Pink noise will never make the "Top 10 Greatest Hits List."

After completing the Discrete Mode sampling, you may want to perform a Continuous Mode sample to "smooth" your EQ curve. This step is **not** necessary, however, a modest improvement in your EQ curve may be achieved with the addition of the continuous mode sample.

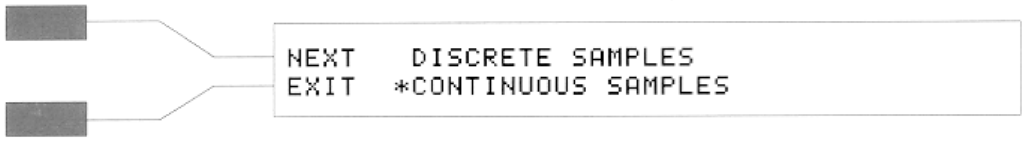
Note: If you feel comfortable with the EQ curve you created from the discrete samples, by all means keep it and move on. It is also important to note that the continuous mode ***should not*** be used as the only method of auto-equalization.

Having pressed the "EXIT" button at the conclusion of last discrete sample, you should be at the following display:



To start taking continuous samples:

1. Position the cursor alongside "Continuous Samples."



2. Press the "NEXT" soft button.

3. Press the "START" soft button to begin taking continuous samples.

4. Sampling will continue until the "STOP" soft button is pressed.

To get the most accurate readings it is necessary to carry the microphone around the room to get sample from several locations. Since it is necessary to handle the microphone , care should be taken any noise you make can be picked up and averaged in sample being taken.

Once you have gathered enough of a sample (approximately one to five minutes) Press the "STOP" soft button to complete the sampling process. Once the "STOP" button has been pressed the CEQ-280 will take the average EQ curve from the continuous sample and average it with the discrete EQ curve captured earlier. It is important to note that the CEQ-280 places much more emphasis on the "current" EQ (in this case the discrete sample taken earlier)

than it does on the continuous EQ curve. The continuous EQ curve is treated like a third or fourth discrete curve. This means that it get approximately ¼ to ⅓ the consideration of the current EQ curve.

6.15 EQ Display with RTA

This display presents both the current EQ settings (in the top of the display) and a real-time display of the relative level of the audio signal being equalized (in the bottom of the display). The equalizer can be viewed and adjusted while viewing the RTA. This display works well when used with the Feedback Finder (see the next section).

To access this display, press the "DSPL" soft button while in the main EQ display. If you do not see any activity in the RTA display, move the cursor all the way to the right (past the 16 kHz band); the display should look like the one below. Pressing the *up arrow* button will increase the sensitivity (the reference level in the display will become more negative).

(No Activity in RTA)

Note: Although this display looks just like the display you see when the RTA button is pressed, they are different and display different information. The RTA in this display responds to the audio signal going through the equalizer. The RTA you see in the display when the RTA button is pressed represents the signal connected to the RTA input (usually the AVR-1 sample mic).

(Activity in RTA)

Unless the Feedback Finder is on, the decay rate of the RTA can be set to one of three rates (slow, medium, and fast). (*The Feedback Finder always uses fast.*)

Note: Changing the decay rate requires pressing the RTA button, which temporarily bypasses the equalizer.

Press the **RTA** button twice, the following display will appear. Use the *up* and *down arrow* buttons to select the desired rate.

Press the **EQ** button and "DSPL" soft button to return to the EQ RTA display.

6.16 The Feedback Finder

The Feedback Finder provides you with the means to track down and eliminate any feedback problems. With the Feedback Finder turned on, the cursor will track bands with a potential problem. You may, then, manually adjust the cut or boost to optimize the systems performance.

To turn the Feedback Finder on:

1. Press the **Global** button.

2. Press the "NEXT" soft button.

3. Use the *left* and *right arrow* buttons to position the cursor alongside "FB-FIND" and press the *up* or *down arrow* button to turn it on.

Once the Feedback Finder is on and you have auto-equalized your system:

1. Go to EQ RTA (see section 6.15) display and adjust RTA level.
2. Turn up the level until the system feeds back, but not loud.
3. The cursor will jump to that band where feedback occurs.
4. Press the *down arrow* button to drop the level 1 dB.
5. Repeat a few times. You should not need to reduce any band very much. Try not to go to far; it may adversely affect sound quality.
6. Once you are satisfied, name and save the curve.

7.0 ADVANCED OPERATIONS

This section deals with the more advanced uses for the CEQ-280. It is not intended for everyone and is not necessary for simple application but as you become familiar with the CEQ-280, reading this section may help you get the most from this product.

7.1 Microphone Selection/Creation

The choice of microphone to use with the CEQ-280 RTA is crucial to proper performance. The recommended microphone is the Peavey AVR-1. The mic is an omni-directional condenser mic with a wide, smooth response. The compensation curve for this mic is stored in the CEQ-280 and is selected by placing the cursor next to "AVR-1" in the RTA mic selection display. It is possible to use other microphones with the CEQ-280 by selecting "CREATE" in the mic selection display then entering its frequency response.

What makes a good RTA microphone?
The characteristics of good RTA microphones are that they are omni-directional with a wide, smooth response. Most directional microphones have several characteristics that make them poor choices. First, directional microphones seldom have directional characteristics that are the same at all frequencies. Most become almost omni-directional at low frequencies which cause the frequency response to change as a function of how much sound enters the rear of the mic. Next, directional mics have a characteristic called "proximity effect." This causes the bass to be boosted as the source gets close to the mic. Because most vocal mics are designed to be used up close, the low frequency response is reduced to flatten the response up close. This results in bass roll-off at a distance. Finally, mics intended to be hand-held often have reduced sensitivity at low frequencies to reduce handling noise.

7.2 Creating a Microphone Curve

Although it is recommended you use the Peavey AVR-1 microphone for automatic equalization, it is possible for you to create a new microphone curve if you have the microphone frequency response curve from the manufacturer of the microphone you intend to use.

Note: What is needed for this procedure is the **true** microphone frequency response curve from the manufacturer, ***not*** the optimized frequency response curves found in advertisement copy for a microphone.

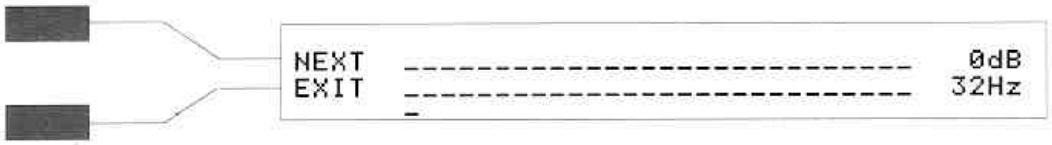
To Create a Microphone Curve:

1. Press the **RTA** button twice.
2. Press the "AUTO" soft button.
3. Use the *left* and *right arrow* buttons to position the cursor alongside "CREATE."

4. Press the "NEXT" soft button.

The CEQ-280 defaults to INSTR because it is a flat curve. You can change this to use any of the stored curves as a starting point. Use the *up* and *down arrow* buttons to select the curve with which you want to start.

5. Press the "NEXT" soft button and begin to enter your microphone curve.



6. When you have completed entering the curve, press the "NEXT" soft button to store the curve.

7. Select from CURVE1 through CURVE5 as the storage location for your new microphone curve and press the "STORE" soft button. The following screen will be displayed briefly:

7.3 Room Target Curve Selection/Creation

What is a target response curve?

The target response curve is the system frequency response you wish to achieve after equalization. This is the curve you should see on the RTA display.

Why not just equalize my system flat?

High frequencies are absorbed by air at a greater rate the than low frequencies. There are few people who are used to listening to a snare drum or vocalist from one inch away. Most of the listening that we do is from a distance and that is what sounds natural. If a speaker system has a flat response the response we would measure in the club or auditorium would exhibit a high frequency roll-off. Equalizing the system flat in the middle of the room would make the system sound overly bright and harsh.

What curve should I use?

The amount of high frequency roll-off you want in your system depends on how far you are from the speaker system and how the system is going to be used. If you are in a medium to large room, RM1 or RM2 will work well. If you are in a small room or if you feel you need more highs, try RM3.

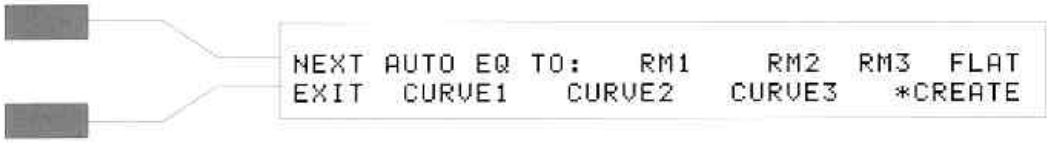
Why should I create a custom target curve?

From the previous discussion, you may want to create a new curve with a different amount of high frequency roll off. But, one of the more important reasons for creating a custom curve may be to customize the low frequency response.

If you auto equalize your system and find there is a lot of boost at low frequencies, a custom curve may be in order. Putting a lot of extra power into your speakers at low frequencies may not only be a waste of power and amplifier headroom, but may also lead to speaker damage. The best way to handle this is by customizing the target curve to include a low frequency roll-off appropriate for the speakers you are using.

To create a room curve:

1. Press the ***RTA*** button ***twice***.
2. Press the "AUTO" soft button.
3. Select the microphone curve you want to use in creating your new room curve and press the "NEXT" soft button.
4. Use the *left* and *right arrow* buttons to position the cursor alongside "CREATE."



5. Press the "NEXT" soft button.

The CEQ 280 defaults to FLAT because it is a flat curve. You can change this to use any of the stored curves as a starting point. Use the *up* and *down arrow* buttons to select the curve with which you want to start.

6. Press the "NEXT" soft button and begin to enter your room target curve.

Enter the frequency response curve you hope to achieve. If auto equalization with one of the room curves resulted in excessive boost of the low frequency bands, lower those bands in the target response. When creating a target response curve, the curve should be fairly smooth and free of large abrupt changes.

7. When you have completed entering the curve, press the "NEXT" soft button to store the curve.

8. Select from CURVE1 through CURVE3 as the storage location for your target EQ curve, and press the "STORE" soft button. The following screen will be displayed briefly:

7.4 Combining Two EQ Curves by Addition

7.4a Overview

The CEQ 280 provides you with the capability to add two curves together. This allows you to create separate room and effects EQ curves and store each of them so they can later be combined. You could use this feature, for example, to add small amounts of high frequency boost or cut to an existing room EQ curve.

The "Transparent Window" Technique

Once you equalize your sound system for the room you are in (room curve), this curve is no longer of any real interest. What becomes important are different "effect" curves you want to add to the "room" curve. The CEQ-280 makes this easy by only displaying the effect curve and not the added room curve. The room curve is still there and is being used, but it is transparent. To create an effect curve, add your room EQ to a flat EQ setting (the display will show flat). Now move the "sliders" to create an effect. Although the two curves are combined in the equalizer, they are still stored as two separate curves. Although the graphic display only shows the "effect" curve, the actual amount of (dB) cut or boost is displayed in the upper right corner of the screen.

Note: The CEQ-280 has a ±12 dB maximum EQ capability; therefore, if you add two curves that would normally add up to more than 12 dB, the CEQ-280 will max them out at +12 dB.

7.4b Adding two curves

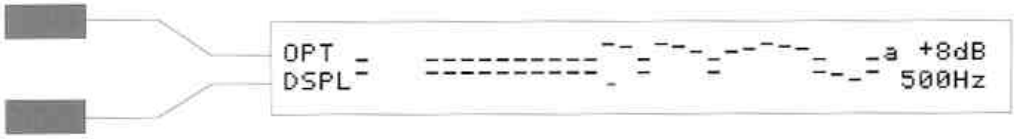
Adding two curves is as simple as pressing a few buttons and selecting the curves to add.

To add two curves:

1. If you are not on the EQ main display page, press the **EQ** button to go there.
2. Press the "OPT" soft button.

3. This display indicates that currently no curves are added. Press the *left* or *right arrow* button until the cursor is alongside "ADD" and press the *up* or *down arrow* buttons to turn "ADD" on.
4. Press the *left* or *right arrow* button until the cursor is alongside "001" and press *up* or *down arrow* buttons to select the curve that you want to add.

5. The two curves are now added. Press the "EXIT" soft button to return to the main EQ display and notice the "a" added after the last EQ band.



7.4c Storing

Use the following procedure to store the added curve:

1. Press the **Store** button.

2. It is possible to change the location number of your stored program. If the cursor is not alongside the program number, move it there. Use the *up* and *down arrow* buttons to change the location.
3. Next, position the cursor alongside the program name (TomU in our example). If you want, you can now change the name of the program.
4. When you are satisfied with your changes, press the "STORE" soft button. You should see the following display:

7.4d Recalling

To recall a stored program:

1. Press the **Recall** button.

2. With the cursor at the program number as shown above, use the *up* and *down arrow* buttons to select the Program Preset number you want to recall. If the program was stored with an ADD, the display will appear as above.
3. To recall the program as it was stored, press the "RECALL" soft button. You should see the following display:

4. Press the "EXIT" soft button to return to the main EQ display.

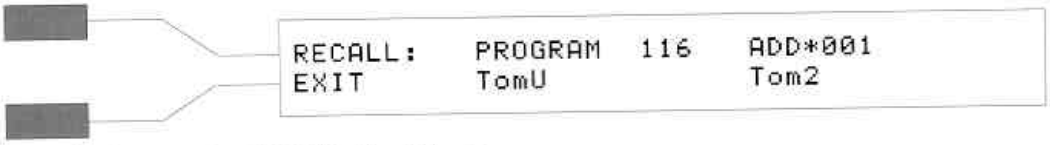
Note: Whenever the RECALL soft button is pressed, a recall operation is carried out.

The following is a list of the parameters recalled:

EQ curve
EQ gain
ADD program On/Off
ADD program number
EQ range

Subsonic On/Off
User label

If you want to recall a program, but want to change the ADD On/Off, use the right arrow button to position the cursor alongside the ADD legend. Use the *up* or *down arrow* buttons to turn the ADD on and off. If you want to add a different preset, position the cursor alongside the ADD program number:



When you are satisfied, press the "RECALL" soft button.

7.5 Global MIDI functions

7.5a MIDI Overview

The MIDI implementation on the CEQ-280 opens the door to many creative applications. Stored curves can be recalled via MIDI, individual EQ bands and controls can be adjusted via MIDI, and stored curves can be sent and received. Here are a few application ideas:

Two or more CEQ-28s can be connected via MIDI so EQ changes made in one unit will also be made in the other(s). This can be handy for stereo applications.

Because MIDI programs change commands cause curves to be recalled, the CEQ-280 can be connected to other effects units in a guitar or keyboard instrument rig so that the EQ changes with the other effects.

The MIDI system exclusive dump of presets allow stored curves to be transferred to a MIDI storage device such as the Peavey MIDI Streamer or to another Peavey CEQ-28.

For most MIDI applications, the Peavey CEQ-280 comes initialized ready to go without having to adjust MIDI parameters. However, for those persons who need to change the MIDI controller assignment for the sliders and switches or to select the MIDI messages the CEQ-280 sends and receives, these facilities are available.

7.5b Factory Default Settings

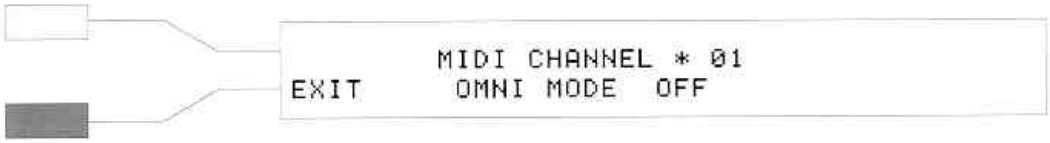
The following is a list of MIDI default settings when shipped from the factory and when re-initialized:

- MIDI Channel - 1, OMNI Mode - off
- MIDI Controllers - EQ gain on continuous controller 0
  EQ sliders on continuous controllers 1 to 28
- MIDI Switches - Subsonic continuous controller - 64
  EQ range continuous controller - 65
- MIDI Send/Receive - Program Change - Yes (send and receive)
  Continuous Controller - Yes (send and receive)
  System Exclusive - Yes (receive only)
  Thru - No
- MIDI System Exclusive - Dump Preset - 0
  Load Preset - 0

7.5c Setting the MIDI Channel

1. Press the **Global** button.
2. Use the *left* and *right arrow* buttons to position the cursor alongside "MIDI CHANNEL."

3. Press the "NEXT" soft button.



4. Use the *up* and *down arrow* buttons to select the MIDI channel for sending/receiving MIDI data.
5. If you want to turn the omni mode on, use the *left arrow* button to select "OMNI MODE" and toggle it from OFF to ON. The OMNI setting allows the CEQ-280 to respond to valid MIDI commands received on **any** channel.

7.5d Remote Recall of Stored EQ Curves

Since the CEQ-280 accepts program change messages (when turned on), it is possible to recall EQ curves via MIDI. This can be done from another CEQ-280 or from any device that sends program change messages (such as the Peavey PC™ 1600). For the remote recall to work, several conditions must be met:

1. Both units must be set to the same MIDI channel. (Unless the OMNI mode is on.)
2. A valid program change message must be received.

7.5e Stereo Slave

When two CEQ-280's are connected via MIDI, it is possible to have one CEQ-280 control the actions of the other. For this to happen, it is necessary for the controlling CEQ-280 to be set to send program change and continuous controller messages. It is also necessary for the receiving (or slave) CEQ-280 to be set to receive program change and continuous controller messages. Also, both CEQ-280's must be on the same MIDI channel and both units must have the controller numbers set the same (when both units are CEQ-280's).

When both CEQ-280's are configured properly, performing an action on the sending (or Master) CEQ-280 will cause the same action to be performed on the slave CEQ-280.

For example: Recalling preset #1 on the master unit will cause preset #1 to be recalled on the slave unit. This does not guaranty that the presets are the same, only that the same preset number is recalled. To make sure that the presets are identical, dump the preset (or presets) you want to use from the master CEQ-280 to the slave CEQ-280. This will insure that the presets are identical when recalled.

When an individual EQ band is adjusted, the corresponding EQ band on the slave unit is set the same.

7.5f Dump EQ Curves to another CEQ-280

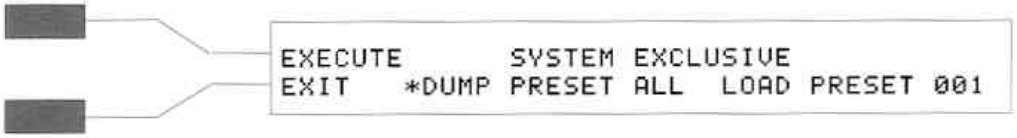
It is possible (and sometimes even desirable) to dump all presets, one preset, or the current EQ setting from one CEQ-280 to another. The receiving CEQ-280 must be set up to receive on the same MIDI channel the sending CEQ-280 is transmitting on, have System Exclusive enabled, and **not** be in the RTA mode. If a dump is received is this fashion, the preset will be loaded into the same preset number it originated from in the transmitting unit (e.g., if you dump preset 5 from one CEQ-280 to another, it will be loaded to preset 5 in the receiving CEQ-280).

If you dump all the presets, all of the presets in the receiving CEQ-280 will be replaced with the preset data from the sending CEQ-280.

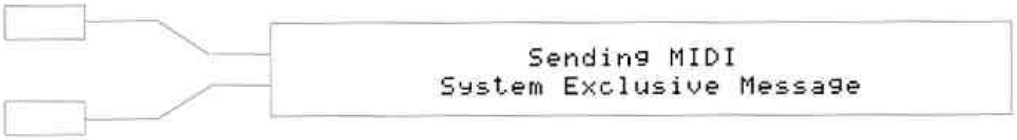
To dump all presets from one CEQ-280 to another:

1. Press the **Global** button.
2. Use the *left* and *right arrow* button to position the cursor alongside "MIDI SYS-EX."

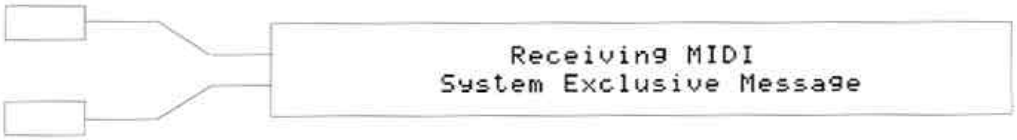
3. Press the "NEXT" soft button.



4. Use the *left* or *right arrow* button to select "DUMP PRESET" and change this to "ALL" by using the *up arrow* button to scroll past preset 128.
5. Press the "EXECUTE" soft button. All the presets from the sending unit will replace all the presets on the receiving unit. All preset numbers will be identical.



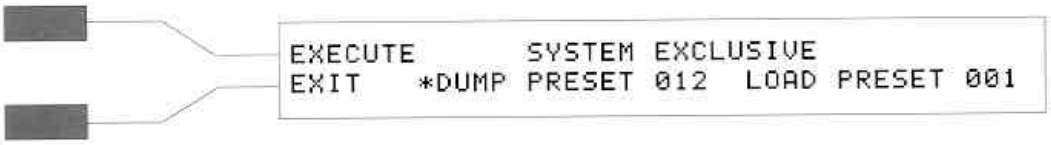
The sending MIDI message will appear on the sending unit, while the receiving MIDI message will appear on the receiving unit. This indicates that a successful dump is in progress.



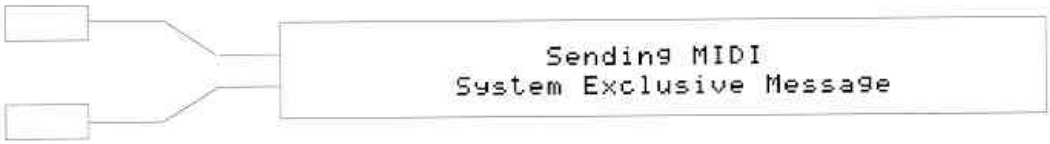
To dump a single preset from one CEQ-280 to another:

1. Press the **Global** button.
2. Use the *left* and *right arrow* button to position the cursor alongside "MIDI SYS-EX."

3. Press the "NEXT" soft button.



4. Use the *left* or *right arrow* button to select "DUMP PRESET" and change this to the preset (012 in our example) you want to dump to the receiving CEQ-280.
5. Press the "EXECUTE" soft button. The preset number selected will replace the same preset number on the receiving CEQ-280.

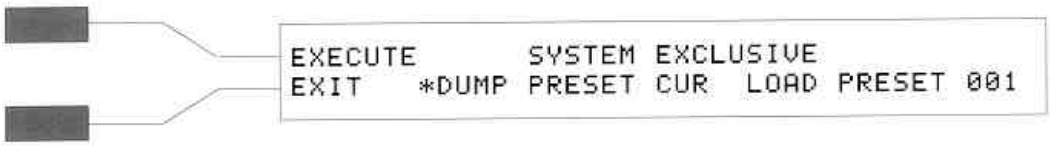


This indicates that a successful dump is in progress.

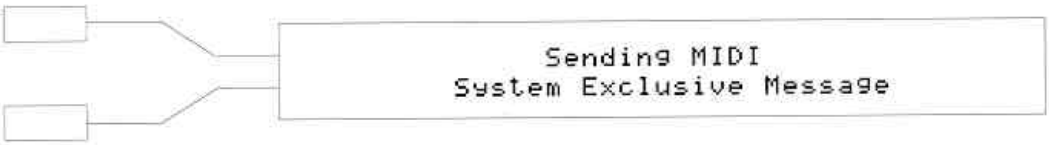
To dump the current preset from one CEQ-280 to another:

1. Press the **Global** button.
2. Use the *left* and *right arrow* button to position the cursor alongside "MIDI SYS-EX."

3. Press the "NEXT" soft button.



4. Use the *left* or *right arrow* button to select "DUMP PRESET" and change this to "CUR" by using the *up arrow* button to scroll past preset 128 and ALL.
5. Press the "EXECUTE" soft button. All the presets from the sending unit will replace all the presets on the receiving unit. All preset numbers will be identical.



This indicates that a successful dump is in progress.

7.5g Dump EQ Curves to a MIDI Storage Device

Dumping EQ curves to a MIDI storage device such as the Peavey MIDI Streamer is similar to dumping them to another CEQ-280. If you already have a request string setup in the MIDI Streamer, you can use the MIDI Streamer to request a dump of the EQ curves. (See the User's Guide for complete details.) Otherwise, you can set the MIDI Streamer to wait for an incoming system exclusive dump. Use the following procedure to dump the EQ curves to a MIDI Streamer when the MIDI Streamer is waiting for a system exclusive dump:

1. On the MIDI Streamer, press the **SysX*Record*** button. Then press the ***Start*** button. The MIDI Streamer should now indicate that it is "Awaiting SysX Data."
2. On the CEQ-280, we will use the same procedure as dumping to another CEQ-280, press the ***Global*** button.
3. Use the *left* and *right arrow* button to select "MIDI SYS-EX" and press the "NEXT" soft button.
4. Use the *left* and *right arrow* buttons to select "DUMP PRESET" and change this, using the *up* and *down arrow* buttons, to "ALL." (Or any preset number that you want to dump.)
5. Press the "EXECUTE" soft button when you have made your selections.
6. You should see the MIDI Streamer indicate that it is "Receiving SysX Data." You will also notice a "byte" count of the incoming data.
7. When the dump is complete, you will need to save the information on the MIDI Streamer to diskette. Follow the instructions in the User's Guide for this procedure.

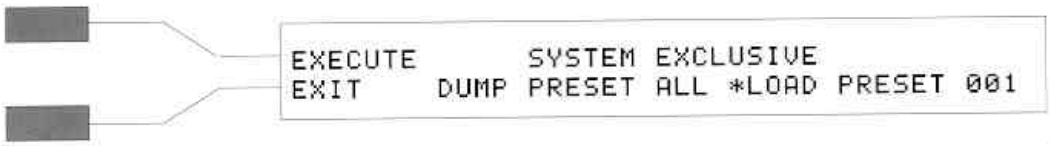
7.5h Loading EQ Curves

Loading EQ curves is only necessary when you want to load an EQ curve to a different location than the one from which it is being dumped. Otherwise, just dump the EQ curves; they'll end up in the same place on the receiving unit that they were in on the sending unit.

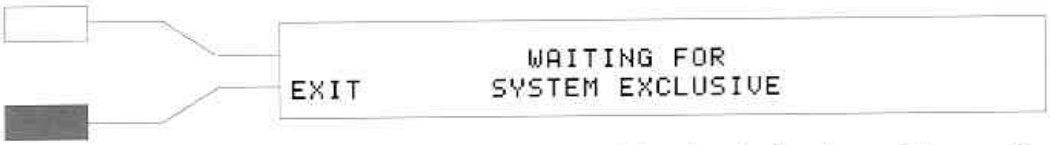
To dump a preset from one CEQ-280 to another and have it load into a different preset number in the receiving unit:

1. Press the **Global** button.
2. Use the *left* and *right arrow* button to position the cursor alongside "MIDI SYS-EX."

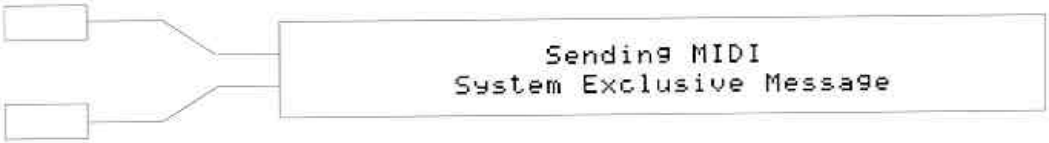
3. Press the "NEXT" soft button.



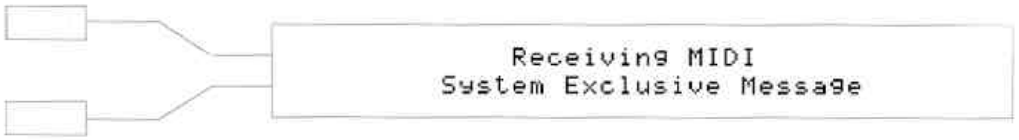
4. Use the *left* or *right arrow* button to select "LOAD PRESET" and change this to the preset number you want the incoming preset to be stored in.
5. Press the "EXECUTE" soft button.



6. Press the "EXECUTE" soft button on the transmitting CEQ-28 to begin the dump. The sending CEQ-280's display will respond with the following screen:



The receiving CEQ-280's display will respond with:



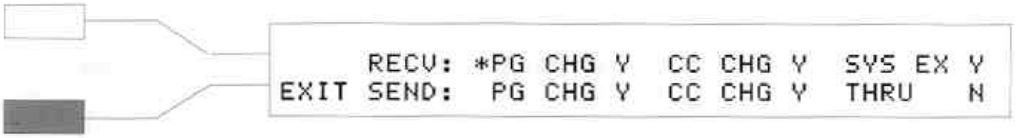
This indicates that a successful dump is in progress. The transferred preset will now be loaded into the desired preset location (001 in our example) in the receiving unit.

7.5i MIDI Send/Receive Filter

The MIDI send/receive filter is used to enable/disable the sending and/or receiving of MIDI program change and continuous controller change functions, as well as the receiving of System Exclusive commands. To access the MIDI send/receive filter:

1. Press the **Global** button.

2. Position the cursor alongside "MIDI SND/RCV."
3. Press the "NEXT" soft button.



4. 'Y' indicates that the action is enabled while 'N' indicates a disabled action. CC is the abbreviation for Continuous Controller. PG is the abbreviation for ProGram. Use the *up arrow* button to make the changes you require.

If a second CEQ-280 is connected and correctly configured as a MIDI receiver, the slider level, overall level, subsonic On/Off and EQ range (6 or 12 dB) will be automatically transmitted to it and will effect the same changes that you make. If Program Change is enabled and Receive is also enabled on the receiving unit, the RECALL command will send the appropriate Program Change to the other unit. A very useful application of these facilities will be found when using two CEQ-280's in a stereo EQ configuration where you may require all EQ changes to be reflected by the second unit.

Note: CEQ-280's **do not** accept MIDI commands when in the RTA mode or send a program change when you recall the last EQ. This is a protection mechanism for your EQ programs.

7.5j MIDI Thru

The MIDI Out jack on the rear of the CEQ-280 also acts as the MIDI Thru jack. This allows any incoming MIDI messages to be echoed (unaltered) to the rest of the MIDI chain.

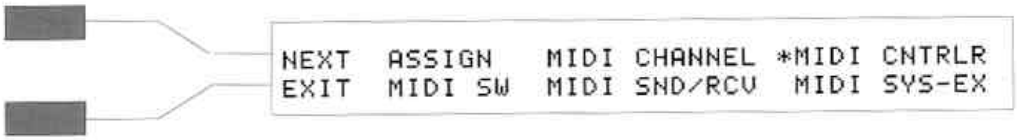
If you use the CEQ-280 to control one or more Peavey CEQ-28R/CEQ-280Rs, it is best to leave the MIDI Thru option turned off. This is turned off/on in the MIDI Send/Receive display (see previous section).

7.5k *Changing MIDI Controller Assignments*

Each of the EQ sliders, EQ gain, and bands can be individually controlled by MIDI. The continuous controller number to which these respond can be changed in this display. The range available is 0 to 120.

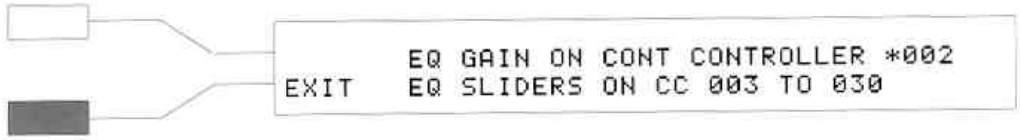
The 29 EQ sliders are arranged as one block of MIDI numbers. This block may be placed to start anywhere in the MIDI number range of 0 to 92. The unit's software will always keep them together as one block. Ease of access is preserved in this way. To enter the MIDI continuous controller display:

1. Press the **Global** button.



2. Position the cursor alongside "MIDI CNTRLR."
3. Press the "NEXT" soft button.

4. If you change the EQ gain controller number, you will find that the slider blocks move accordingly.



5. Here we have changed the gain MIDI controller number. As can be seen, the MIDI slider numbers have changed from 001 to 003 and 028 to 030. The whole block has moved upward together.

Note: You may notice, as you change the controller number, the display will skip some blocks of numbers. This happens because the CEQ-280 checks for conflict between the Gain and EQ slider block and the Subsonic and EQ Range MIDI controller switches and skips numbers that would cause more than one control to be assigned to one number.

7.5l *Setting the MIDI Switches*

The CEQ-280 has two MIDI switches (subsonic filter and EQ range) that can be controlled remotely. An incoming MIDI continuous controller message can change these settings. The subsonic filter can be changed between On and Off, while the EQ range can change between the ±6 dB and ±12 dB settings. Since MIDI continuous controllers can have a value between 0 and 127, any message coming in that is 63 or less will turn the subsonic filter Off, while anything coming in above 63 will turn it on. This same method is used to control the EQ range (only with a different controller number). The CEQ-280 will not allow you to select the same controller number for both switches.

To change the MIDI switches:

1. Press the **Global** button.

2. Position the cursor alongside "MIDI SW" and press the "NEXT" soft button.

3. The CEQ-280 comes from the factory with the subsonic filter set to controller 64 and the EQ range set to controller 65. These can be changed to any controller number (between 29 and 120) you want.

7.6 The Security Lock

The security lock protects the CEQ-280 from "self-appointed sound engineers" by requiring entry of an access code before adjustments can be made. The security lock in the CEQ-280 provides several levels of security to meet your needs. The highest level of security prevents all access to the CEQ-280 via the front panel or MIDI unless a four digit access code is entered. For other applications, the front panel can be locked but MIDI access allowed. Or, the front panel can be locked except for the ability to recall a selected number of curves. This is particularly useful when the CEQ-280 is installed in a permanent system where the end users can recall curves for different situations but cannot adjust any of the curves.

Using the security lock can be divided into two areas. The first sets the lock parameters, including: enabling the security lock, setting the level of protection and establishing the access code. The second area deals with user access once the CEQ-280 lock is enabled.

To setup the security lock, press and hold the "GLOBAL" and lower *soft button* then apply power.

The following display will appear:

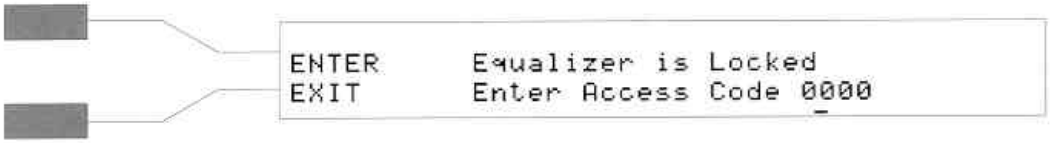
Pressing either the *up* or *down* button will lock the CEQ-280. You can then choose to unlock MIDI, unlock recall of stored curves, and establish the four digit user access code. If you choose to unlock Recall, you can then set the number of the highest curve that can be recalled. For example, if you want the users to have access to three different curves, they would need to be stored in locations 1, 2 and 3. The max recall number in the display should then be set to 3.

When you complete setting the security lock, press the "OK" soft button to store these changes. If the security lock is enabled, holding the "GLOBAL" and bottom soft button at power up will first require entry of the access code before the lock parameters can be changed.

WARNING!!!! BE SURE TO MAKE NOTE OF THE ACCESS CODE THAT YOU ESTABLISH. If lost, regaining access to the unit is difficult. Contact Peavey customer service for assistance.

User access

If the CEQ-280 is locked, pressing any button (except "RECALL" if it is enabled) will cause the following display to appear:



Use the cursor buttons to enter the access code, then press the "ENTER" soft button. If the correct code has be entered, you will now have access to all CEQ-280 functions until either the power is removed or the user turns access back off. To turn off access, press the "GLOBAL" button to get to the global menu. Select "ASSIGN" in the menu then press the "NEXT" soft button. Move the cursor to "ACCESS" on the screen and change the "Y" (yes) to "N" (no). The CEQ-280 is now re-locked.

If the wrong code is entered, the following display will appear:

8.0 USING THE CEQ-280 WITH AN CEQ-28R/CEQ-280R

The CEQ-280, like its predecessor, can control the CEQ-28R/CEQ-280R. To set up the CEQ-280 to control an CEQ-28R/CEQ-280R:

Press the **Global** button. Select "ASSIGN." Position the cursor alongside "REM#1" and change this to the number of the CEQ-28R/CEQ-280R to control (up to sixteen CEQ-28R/CEQ-280Rs can be controlled by the CEQ-280, '1' through 'g'). Position the cursor alongside "LOCAL" and press the up arrow button. If all of the connections are properly made, the CEQ-28R/CEQ-280R will respond immediately. For complete details on using the CEQ-28R/CEQ-280R with an CEQ-280, see the CEQ-28R/CEQ-280R's owners manual.

9.0 MIDI IMPLEMENTATION

MIDI Implementation Chart

Date: 7/95

Model: CEQ™-280

Version: 1.0

Function	Transmitted*	Recognized	Remarks
Basic Channel Default Channel	1-16 1	1-16 1	
Mode Default Messages Altered		1,3	memorized Omni; on/off
Note Number True Voice	X	X	
Velocity Note On Note Off	X X	X X	
After Key's Touch Ch's	X X	X X	
Pitch Bender	X	X	
Control Change	0-120 0 Volume 1 Band 1 (32Hz) " " 28 Band 28 (16kHz) 64 Subsonic Filter on/off 65 EQ Range 6/12dB	0-120 0 Volume 1 Band 1 (32Hz) " " 28 Band 28 (16kHz) 64 Subsonic Filter on/off 65 EQ Range 6/12dB	Programmable EQ Vol., Bands 1-28 Programmable as a block Subsonic, EQ Range Individually Programmable Controller value 0 to 63; off, 64 to 127; on 0 to 63; 6dB, 64 to 127; 12dB
Prog Change True#	0-127	0-127	
System Exclusive	O	O	
System : Song Pos : Song Sel Common : Tune	X X X	X X X	
System : Clock Real Time : Commands	X X	X X	
Aux : Local ON/OFF Mes- : All Notes Off sages : Active Sense : Reset	X X X X	X X X X	
Notes			

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO **O** : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO **X** : No

10.0 SYSTEM EXCLUSIVE

This section contains the format of the system exclusive commands used by the CEQ-280.

The range of valid values is also listed for most of the data in the message descriptions. The description of the bit functions of status bytes and other data range information is listed at the end of this section. In all cases, though, data values cannot exceed 127 (hex 7F).

The format below, used for all system exclusive commands, is as follows:

Hexadecimal

F0	Start of System Exclusive
00	Peavey's Manufacturer ID
00	
1B	
04	Peavey Product ID (CEQ-28 family)
0N	MIDI channel #
0X	Command byte
xx	Data bytes
F7	End of Exclusive (EOX)

The header used for all commands consists of:
F0 00 00 1B 04 ON (where "ON" is channel 0-15)

The command bytes and data formats are listed below:

1. Load a preset (87 bytes)
   When received, the preset data is loaded into receiving unit.

01	Load preset command byte
nn	Preset # to be loaded (0-127)
DATA	78 bytes (39 data bytes sent a nibble at a time)
F7	EOX

2. Dump a preset (9 bytes)
   When received, the unit sends the requested preset data in a load preset format (see above).

02	Dump preset command byte
nn	Preset # to be dumped (0-127)
F7	EOX

3. Load all preset (9993 bytes)
When received, all 128 presets are loaded with the new data.

03	Load all presets command byte
DATA	9984 bytes (128 presets * 39 bytes * 2 nibbles)
CKSUM	2's compliment of the Modulo 128 sum of the DATA bytes (CKSUM = -1 * Modulo 128 sum of data). The SUM of the received CKSUM and the Modulo 128 sum of the received data should equal zero.
F7	EOX

4. Dump all presets (8 bytes)
When received, the unit dumps all program presets in the load all presets format above.

04	Dump all presets command byte
F7	EOX

5. Load Current EQ (47 bytes)
When received, the current EQ settings are loaded and become active.

18	Load current EQ command byte
DATA	39 bytes current data in program preset format
F7	EOX

6. Dump Current EQ (8 bytes)
When received, the CEQ-280 sends a "Load Current EQ" message with the current EQ data.

19	Sump current EQ command byte
F7	EOX

7. Set MIDI controller numbers
This message assigns MIDI control numbers for control of the EQ band levels, subsonic filter and EQ range.

1A	Set MIDI controller numbers command byte
xx	Controller number for EQ level. This controller is the first in the block of 29 controllers that control EQ level, band 1 (32 Hz) through band 28 (16 kHz).
vv	Controller number for subsonic filter. Be sure to set it so that it does not conflict with the EQ controller block or EQ range.
xx	Controller number for EQ range. Be sure to set it so that it does not conflict with the EQ controller block or EQ range.
F7	EOX

Each program preset consists of the following 39 bytes:

Byte	**Description**
1	CC value for EQ gain
2	CC value for band 1 (32 Hz)
3	CC value for band 2 (40 Hz)
4	CC value for band 3 (50 Hz)

-
-
-

28	CC value for band 27 (12.5 kHz)
29	CC value for band 28 (16 kHz)
30	MIDI status byte STAT2
31	ADD program preset number
32	8 character user label field
33	8 character user label field

-
-
-

39	8 character user label field

MIDI Status Byte

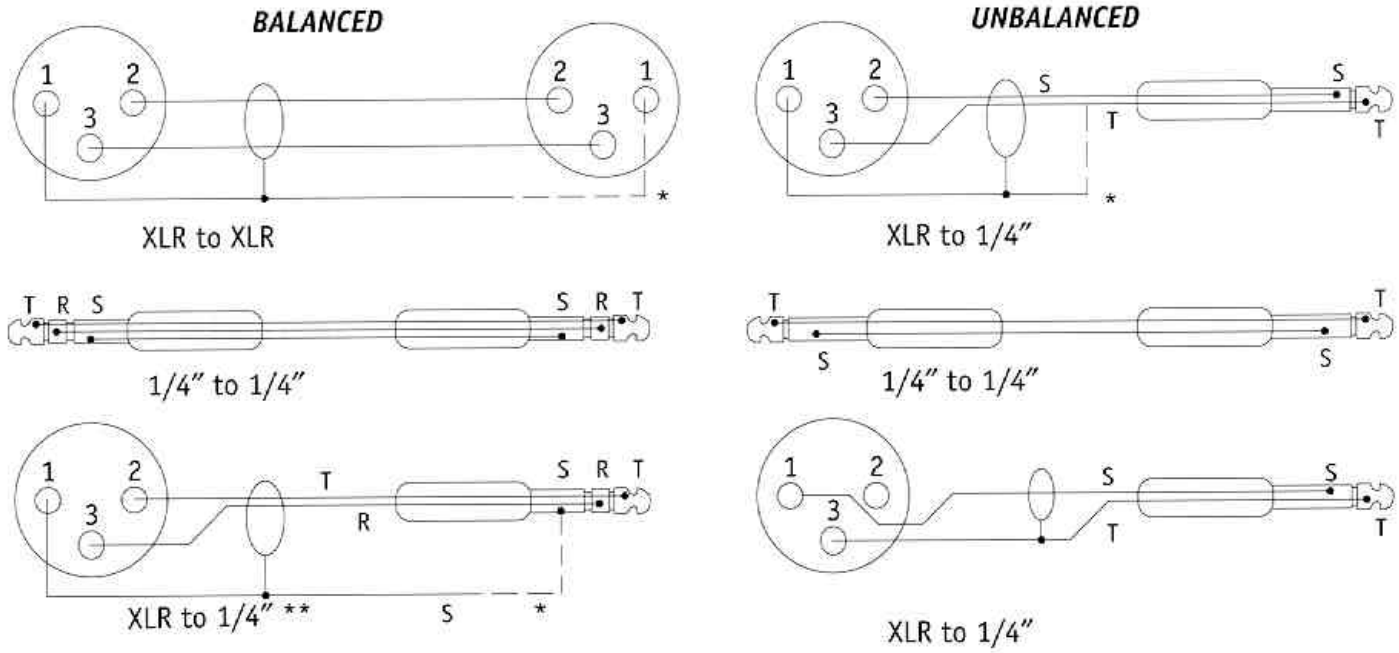
S	Subsonic filter ON/OFF
R	EQ Range
A	ADD ON/OFF
x	Don't care

Note: The CEQ-280 displays the program presets (0-127) as 1 to 128.

The system exclusive data in messages 1 and 3 are transmitted a nibble at a time. The high nibble (top 4 bits) is transmitted first, followed by the low nibble.

11.0 RECOMMENDED CONNECTIONS

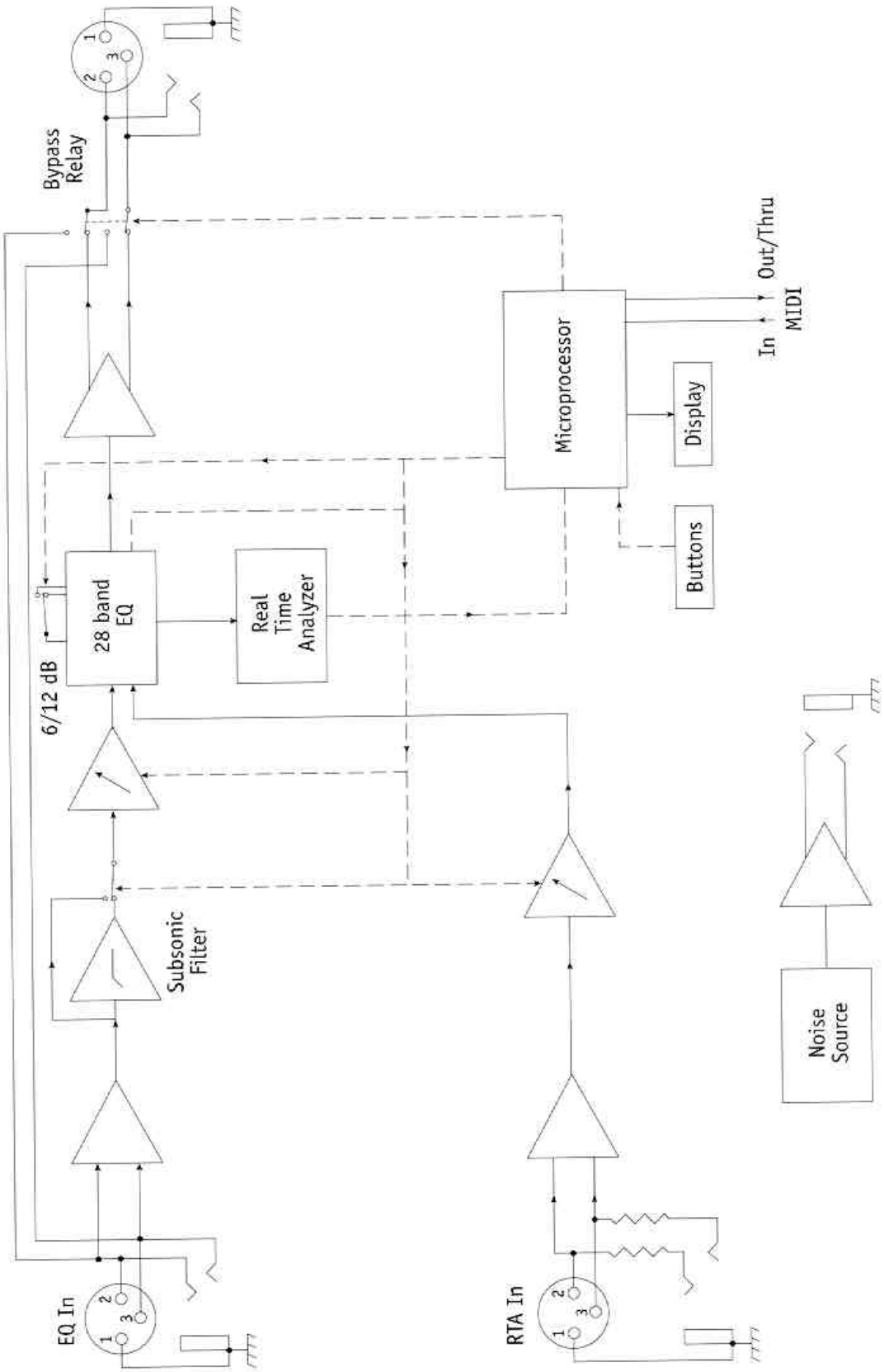
Input/Output Connections:
The inputs and outputs on the CEQ-280 are a "transformer like" electronically balanced circuit. when used in an unbalanced application, be sure not to leave pin 2 or 3 on the XLR connector, or the plug on the 1/4" connector, unconnected.



Note:
* To prevent ground loops, the shield is best connected only at one end. (The end with the best earth ground.) In environments where a strong RF field exists, the shield can be connected to ground at the other end with a 0.001 µf ceramic capacitor.

** A 3-circuit (tip-ring-sleeve) ¼" plug should only be used with equipment that has connections on a 3-circuit (tip-ring-sleeve) jack.

12.0 BLOCK DIAGRAM



13.0 SPECIFICATIONS

Frequency Response	5 Hz - 50 kHz +- 1 dB
THD (EQ Flat)	Less than 0.01% .003 typical
Output Noise (EQ Flat)	Below -94 dBV (ref 1V) (20 Hz - 20 kHz)
Dynamic Range (EQ Flat)	Greater than 110 dB (20 Hz - 20 kHz)
Input	Electronic Balanced XLR or ¼" phone TRS
Input Impedance	Greater than 10k ohms
Input Common-Mode *Rejection Ratio*	Greater than 40 dB
Maximum Input Level	+23 dBV (14V rms) ref 1V
Output	Electronic Balanced XLR and ¼" phone TRS
Output Impedance	100 ohms
Maximum Output Level	+17 dBV (7V) Hi-Z load (ref 1V) +18 dBm 600 ohm load (1mw)
Filter Frequencies	32 Hz - 16 kHz on ISO centers
Max Boost/Cut	±12dB in 12 dB Range setting ±6 dB in 6 dB Range setting
EQ Band Filter Q	4.77
Power requirements	16 - 16.5 VAC 1A
Dimensions	Width 19 inches (48.3 cm) Height 1.75 inches (4.4 cm) Depth 9 inches (22.8 cm)
Weight	6.25 pounds (2.84 kg)

LIMITED WARRANTY

Peavey Electronics Corporation warrants to the original purchaser of this new Architectural Acoustics product that it is free from defects in material and workmanship. If within one (1) year from date of purchase a properly installed product proves to be defective and Peavey is notified, Peavey will repair or replace it at no charge. (Note: Batteries and patch cords not covered.) "Original purchaser" means the customer for whom the product is originally installed.

Damage resulting from improper installation, interconnection of a unit or system of another manufacturer, accident or unreasonable use, neglect or any other cause not arising from defects in material and workmanship is not covered by this warranty. The warranty is valid only as to products purchased and installed in the United States and Canada.

THIS LIMITED WARRANTY IS IN LIEU OF ANY AND ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE. UNDER NO CIRCUMSTANCES WILL PEAVEY BE LIABLE FOR ANY LOST PROFITS, LOST SAVINGS, INCIDENTAL DAMAGES OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT, EVEN IF PEAVEY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. THIS LIMITED WARRANTY IS THE ONLY EXPRESSED WARRANTY ON THIS PRODUCT, AND NO OTHER STATEMENT, REPRESENTATION, WARRANTY, OR AGREEMENT BY ANY PERSON SHALL BE VALID OR BINDING UPON PEAVEY.

Peavey's liability to the original purchaser for damages for any cause whatsoever and regardless of the form of action is limited to the actual damages up to the greater of Five Hundred Dollars ($500) or an amount equal to the purchase price of the product that caused the damage or that is the subject of or is directly related to the cause of action. This limitation of liability will not apply to claims for personal injury or damage to real property or tangible personal property allegedly caused by Peavey's negligence. For information on service under this warranty, call a Peavey customer service representative at (601) 483-5376.

IMPORTANT SAFETY INSTRUCTIONS

WARNING: When using electric products, basic cautions should always be followed, including the following.

1. Read all safety and operating instructions before using this product.
2. All safety and operating instructions should be retained for future reference.
3. Obey all cautions in the operating instructions and on the back of the unit.
4. All operating instructions should be followed.
5. This product should not be used near water, i.e., a bathtub, sink, swimming pool, wet basement, etc.
6. This product should be located so that its position does not interfere with its proper ventilation. It should not be placed flat against a wall or placed in a built-in enclosure that will impede the flow of cooling air.
7. This product should not be placed near a source of heat such as a stove, radiator, or another heat producing amplifier.
8. Connect only to a power supply of the type marked on the unit adjacent to the power supply cord.
9. Never break off the ground pin on the power supply cord. For more information on grounding, write for our free booklet "Shock Hazard and Grounding."
10. Power supply cords should always be handled carefully. Never walk or place equipment on power supply cords. Periodically check cords for cuts or signs of stress, especially at the plug and the point where the cord exits the unit.
11. The power supply cord should be unplugged when the unit is to be unused for long periods of time.
12. If this product is to be mounted in an equipment rack, rear support should be provided.
13. Metal parts can be cleaned with a damp rag. The vinyl covering used on some units can be cleaned with a damp rag or an ammonia-based household cleaner if necessary. Disconnect unit from power supply before cleaning.
14. Care should be taken so that objects do not fall and liquids are not spilled into the unit through the ventilation holes or any other openings.
15. This unit should be checked by a qualified service technician if:
    a. The power supply cord or plug has been damaged.
    b. Anything has fallen or been spilled into the unit.
    c. The unit does not operate correctly.
    d. The unit has been dropped or the enclosure damaged.
16. The user should not attempt to service this equipment. All service work should be done by a qualified service technician.
17. This product should be used only with a cart or stand that is recommended by Peavey Electronics.
18. Exposure to extremely high noise levels may cause a permanent hearing loss. Individuals vary considerably in susceptibility to noise induced hearing loss, but nearly everyone will lose some hearing if exposed to sufficiently intense noise for a sufficient time.

The U.S. Government's Occupational Safety and Health Administration (OSHA) has specified the following permissible noise level exposures.

Duration Per Day In Hours	Sound Level dBA, Slow Response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

According to OSHA, any exposure in excess of the above permissible limits could result in some hearing loss.

Ear plugs or protectors in the ear canals or over the ears must be worn when operating this amplification system in order to prevent a permanent hearing loss if exposure is in excess of the limits as set forth above. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels such as this amplification system be protected by hearing protectors while this unit is in operation.

SAVE THESE INSTRUCTIONS!

Features and specifications subject to change without notice.

Peavey Electronics Corporation / 711 A Street / Meridian, MS 39301 / U.S.A. / (601) 483-5376 / FAX: 486-1154

#80300257

Printed in U.S.A. 7/96