WEEK 11

MIXING CONSOLE OVERVIEW

Mixing Console Overview

Mixing consoles all share basic features and functionality. No matter whether they are small, semi-pro mixers like the one in your high school auditorium or a giant recording console in a studio, they have some very similar design characteristics and *essentially they do the same thing!*

- Let's review what a sound mixing console consists of because mixers are the "tactile interface" of the audio engineer. The ability to instantly recognize the functions and labels of knobs, faders and meters is required because no two pieces of gear are created the same. A well trained audio professional must be prepared to use any brand or manufacture of equipment at any time. All audio devices have specific functions and they all operate with similar controls and labels. It's up to the engineer to recognize the layout and manipulate the controls in an effective manner.

Mixing Console Overview

- Connectors or Jacks for Input Signals.
- Connectors or Jacks for Output Signals.
- Buttons to control individual functions
- Faders or Potentiometers(Pots) to adjust signal levels at various places in the signal-chain.
- Meters to visually confirm the proper levels of signals.

Mixing Console Overview

The connectors on mixers are basically the same as any other device in the audio chain. Mixers have a few specialized connectors but for now, let's examine the basics of signal input and output.

- Input Connectors

Mixing Console Overview

- Input Connectors

Most of the input connectors on a mixer are going to be for microphones and each input XLR jack is are associated with a “fader strip”. On the PCHS Onyx mixer, there are 20 mic inputs and 4 Line inputs.

Mixing Console Overview

- Input Connectors

Directly above the XLR jacks, there are ¼ Inch Line Inputs.

Mixing Console Overview

- Input Connectors

Directly above ¼ Inch Line Inputs there is the “Insert” jack that is a ¼ inch connector but a special one.
Remember the difference between an unbalanced ¼ Inch and a TRS ¼ Inch?

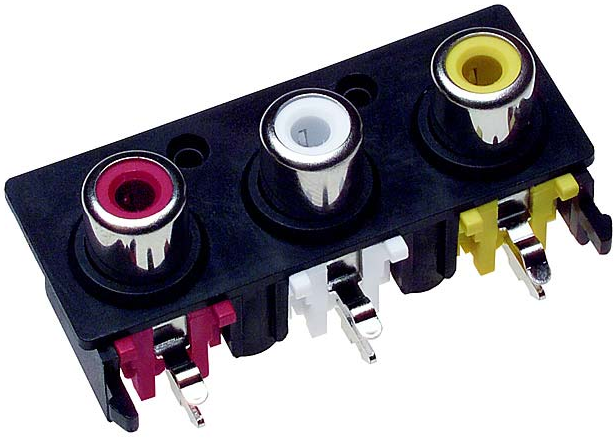
Input Connectors

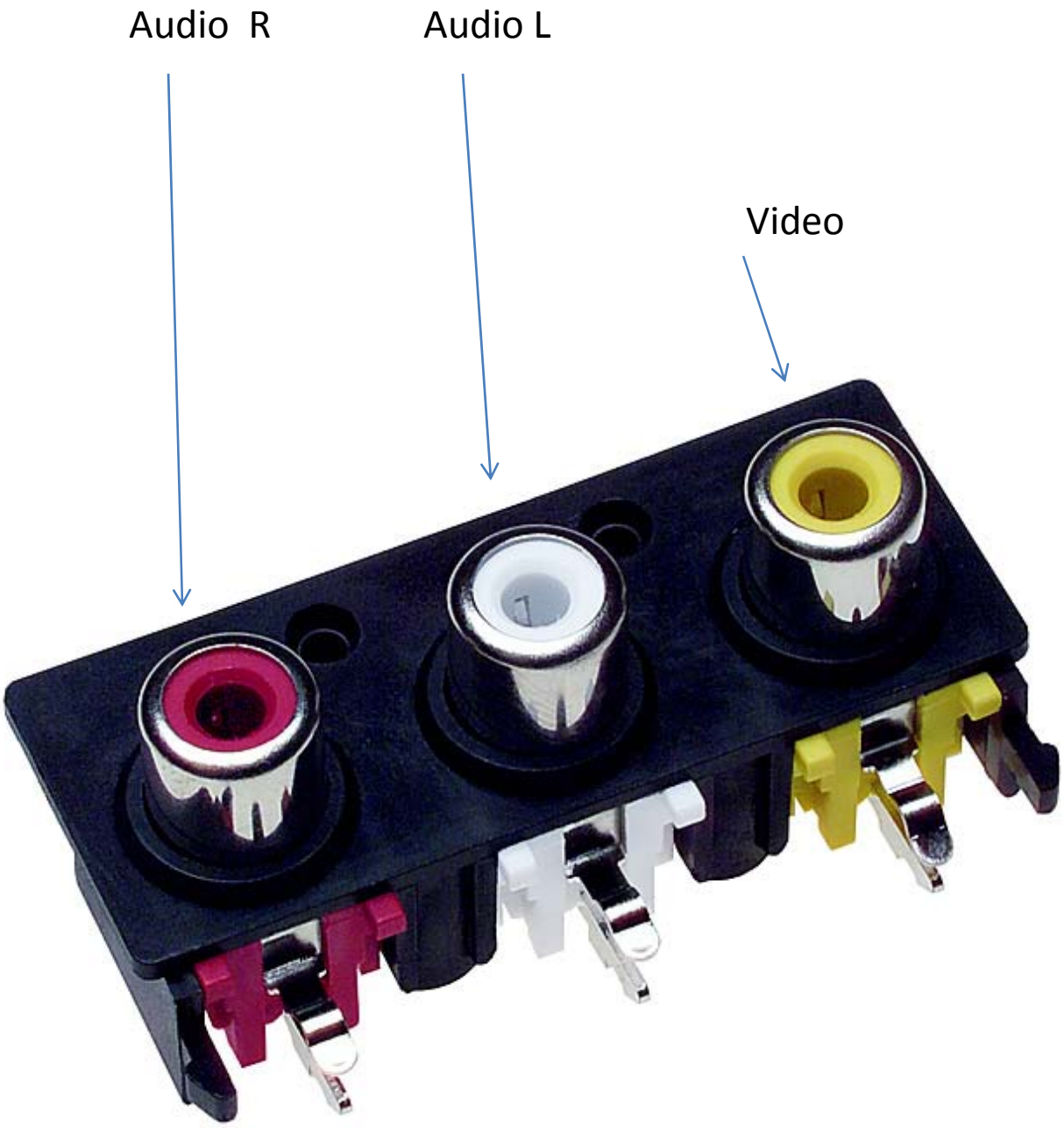
There are XLR and ¼ Inch input connectors on most consoles. Modern professional mixers do not have ¼ Inch connectors as a general rule. Professional equipment is always operated with a signal path that is “balanced” throughout. So there are nothing but XLR connections in professional systems. The exception to that rule is that TRS connectors are sometimes used in place of the XLR but are still balanced nonetheless.

I/O Connectors

Output connectors can also include the following.

- RCA – Analog from common devices.



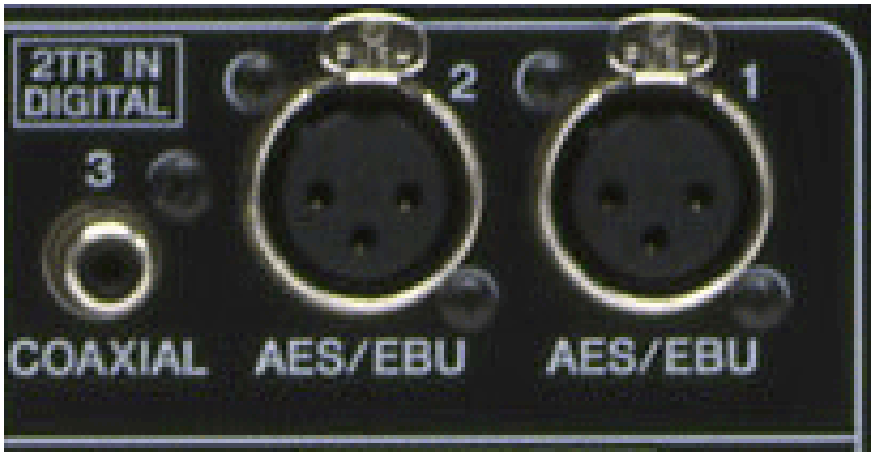


RCA's are used for inputs and outputs. Be careful when you make RCA connections to avoid reversing them. I include these RCA input examples only as a reference as to what you might connect to a mixer. RCA connections are only found on semi-pro mixers, never on professional equipment.

Input Connectors

Input connectors can also include the following.

- AES – Digital 2 track signals (XLR and RCA!)



Even those the appear to be standard RCA and XLR connectors, They both utilize a special form of cable to pass digital signals.

Input Connectors

Input connectors can also include the following.

- USB & Firewire

It's common now to have USB or Firewire connections for several reasons. One use is to connect the mixer directly to a computer that's running special multi-track recording or console control software.

Input Connectors

Input connectors can also include the following.

- USB & Firewire

The second reason is to connect audio interfaces like the Mbox or any other portable microphone preamplifier.

Mixing Console Overview

- Output Connectors

Just to be clear, there are both input and output connectors in this picture. The primary difference as we learned in chapter 9 is the sexual conventions of XLR connector I/O. Male jacks, whether cable type or panel mounted are always Outputs. Female XLR, either inline or panel mount are always Inputs.

¼ Inch jacks DO NOT follow this convention. Female ¼ Inch jacks can be inputs OR outputs. Read the label carefully!

Mixing Console Overview

- Output Connectors

As you'll learn later in Intro to Stagecraft, a flashlight is a common tool that one must carry all the time. In low light situations it's easy to plug a cable into the wrong jack. It's easy to do in a well lit room! When you are making connections to and from consoles, look carefully, take your time and make the connections one at a time so as not to confuse yourself. One person on your team should be responsible rather than making this a team effort.

Mixing Console Overview

- Output Connectors

There are two kinds of connector for the main, L&R outputs.

Why?

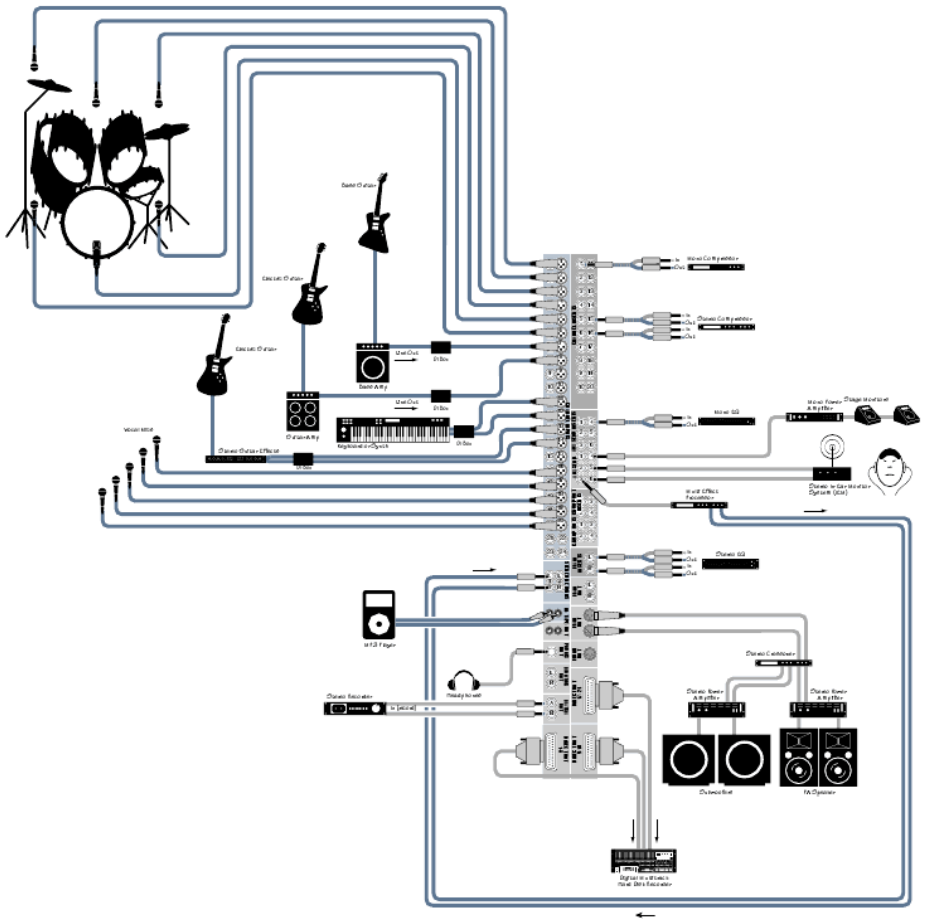
Input & Output Connectors

ONYX 4•Bus

Hookup Diagrams

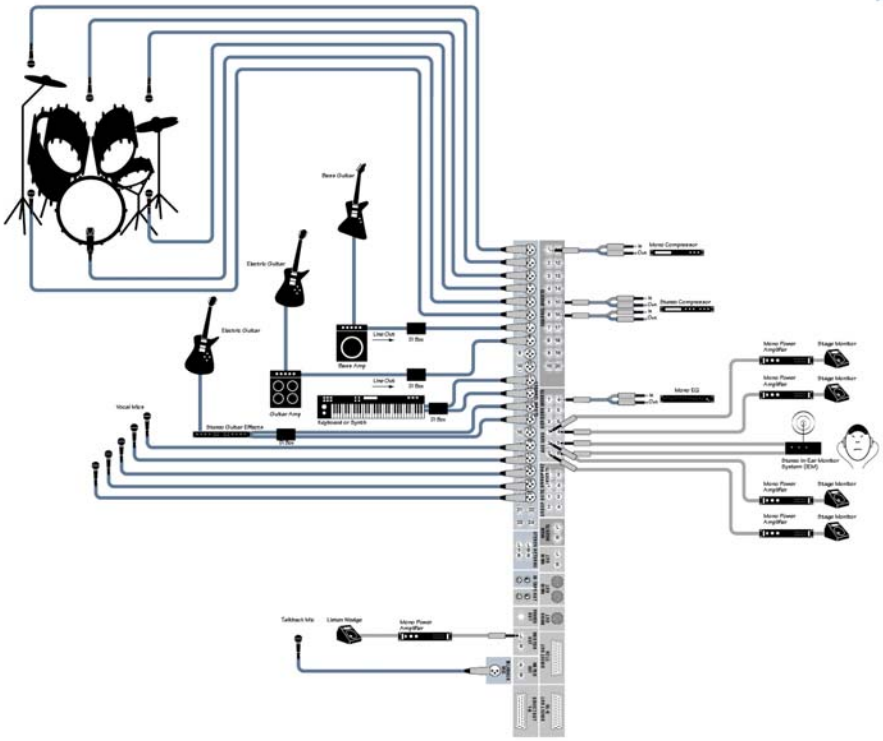
This hookup diagram demonstrates how you can make a live multitrack recording using the DIRECT OUTs. The DIRECT OUTs provide an analog balanced direct output for each channel, pre-EQ. The Matrix outputs are used to create a stereo recording for backup.

Aux Send 4 is used for stage monitors, and a graphic EQ is connected to the Aux 4 Insert jack, serving as a dedicated in-line EQ for the monitors. Aux Sends 5 and 6 are used to drive a stereo IEM system. Aux Send 3 drives a stereo effects processor, whose stereo signal is returned via the Stereo Returns jacks.



Onyx 24•4 Live Club Mix and Multitrack Recording

Input & Output Connectors



This drawing shows the flexibility of the Onyx 4•Bus for creating different monitor mixes. Auxes 1-4 provide separate monitor mixes for four floor wedges. Auxes 5-6 provide a stereo monitor mix for an in-ear monitor (IEM). The Aux Inserts can be used for in-line graphic EQ for each monitor send. A listen wedge is connected to the Monitor Out, allowing you to solo and listen to each monitor mix. The Talkback Mic lets you talk to the talent through the monitors (Aux Sends).

Onyx 24•4 Stage Monitor Mix

Console Buttons

Buttons play the standard role on mixing consoles that they do in our everyday lives.

They:

- Turn something on or off
- Toggle between multiple options

Console Buttons

PFL & AFL Buttons

Mute Buttons

Buttons make it possible to choose the correct metering And listening schemes to help you properly adjust your *Gain Structure*. You must master the operation of your console through the correct use of buttons.

Console Buttons

- Buttons play a very important role in configuring the metering and listen capabilities of any console.
- The metering and audio monitoring functions are the most important tool you have to adjust gain structure.
- Button selection and configuration can be confusing because consoles require so many different ways to meter that they require buttons to configure other buttons!

Console Buttons

So buttons generally have a specific functions beyond on or off etc. And the easiest way to remember this is by classifying some as:

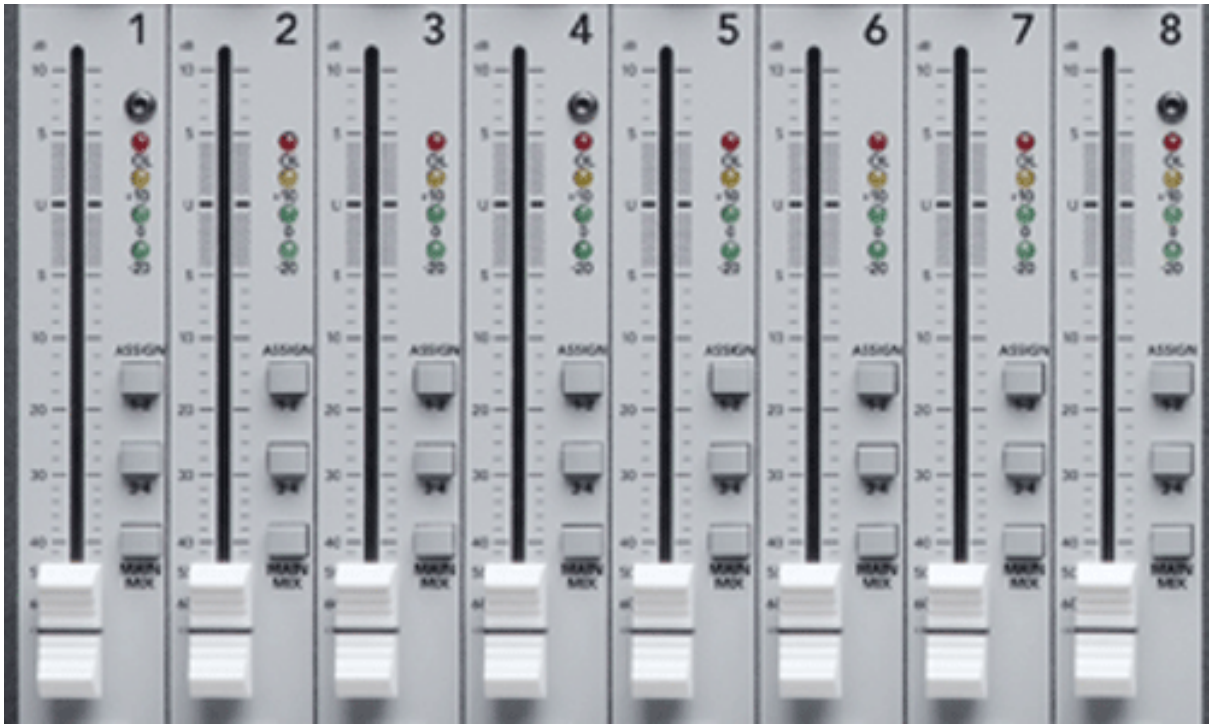
- Regular function buttons
- Meta-function buttons

Faders & Potentiometers

Faders and pots control the flow of signal levels throughout the signal chain. These devices are the main tools you employ, along with metering, to maximize and adjust the *Gain Structure* of your mix. We'll detail gain structure in the next chapter. For now suffice to say that faders play a major role in gain structure. Faders and pots can have distinct sonic impact on signal quality in their own way because of quality and engineering.

Mixing Console Overview

Faders & Pots



These are known as Input Faders. They control the amount of signal that flows through the Pan Pot to the Stereo Output or one of the four mono Sub-Groups. These are your main “tactile interface” during the performance to adjust the level of a single microphone. Each instrument, drum or singer will have it’s own microphone to control and these faders are the primary means of making those adjustments

Mixing Console Overview

Faders & Pots

These are known as the Sub-Mix or Group Faders as well as the Stereo Master fader. These are all Output Faders. They control the amount of signal that flows out through the output jacks on the back of the mixer.

Mixing Console Overview

Faders & Pots

This picture identifies the Pan Pot and the six Auxiliary Send pots directly above the faders. The Aux Sends are used to send an the signal of an input it's associated with, to another output jack on the back of the mixer. The auxiliary outputs are used to send these signals to stage monitors or Effects devices for instance. Where as the Stereo outputs are used to send signals to the amplifiers which power the main speakers.

Mixing Console Overview

Faders & Pots

Directly above the auxiliary send pots are the EQ controls. These pots can have multiple functions that are configured by buttons. In the case of the Onyx, the EQ can be switched out of the signal path entirely with a button.

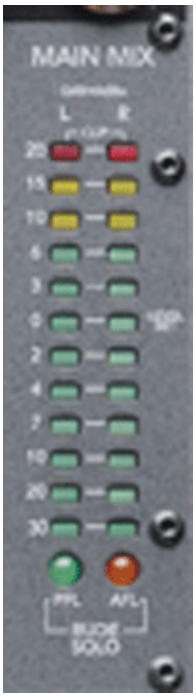
Mixing Console Overview

Meters

Metering signal flow and making adjustments to signal flow is at the heart of good Gain Structure. Meters come in many sizes, shapes and types. Different types are engineered to represent Signal with various “Weightings”.

Mixing Console Overview

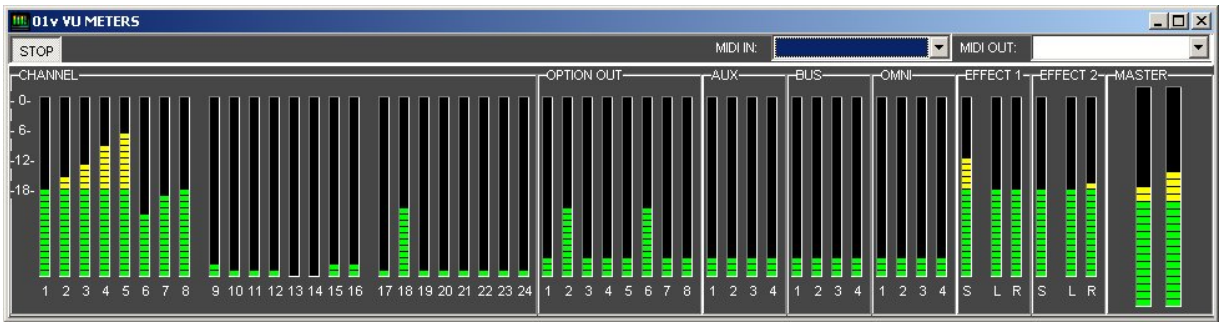
Meters



Even though the Onyx has limited metering, with the proper use and configuration of buttons, one can still visually meter signal flow throughout the entire signal path of the mixer. Again, this is crucial for properly setting the gain structure of your mix. Meters can be hardware or software functions.

Mixing Console Overview

Meters



There are even “virtual meter bridges” that are purely software driven on a computer screen for some mixers. Here, every single input and output has a meter so that the sound engineer can immediately visually identify where a problem in signal flow and gain structure could be occurring within the signal chain of the mixer. This is without a doubt a very nice tool to have when one has a large, multi-instrument mix to deal with. As you’ll learn in Chapter 16, Live Mixing Technique, once you’ve established the correct gain structure in your console, you can begin the most important task of a sound engineer. Adjusting the *relative balance* and tonal characteristics of the individual microphone inputs is the most subtle and artistic efforts of a sound engineer’s job.

Mixing Console Overview

Meters

Meters can also be used to visually represent *Gain Reduction* such as this Waves plug-in. This is just for your reference and not used on the Onyx.

•Normally the Zero point on the meter indicates the level that signal flow should NOT exceed. Above the zero point, clipping begins to occur in signal output.

•If the meter is used to represent *gain reduction*, then the meter pointer is normally pointing at the Zero mark and as gain reduction happens, the meter moves to the left instead of bouncing to the right. The scale to the left indicates the amount of gain reduction the signal is undergoing.

Conclusion

- Mixing consoles therefore are a collections of knobs, buttons, meters, faders and connectors.
- The signals flow into the mixer via the input jacks and connectors.
- Signals stream through the mixer using pathways designated by ***you*** via buttons and knobs.
- Signals stream out of the mixer from various jacks and connectors depending on ***your*** choice.
- All the signals are visualized by meters to maintain the proper gain structure throughout the signal path.