

Amplify and Record Your Instrument! - Edgar Gabriel

A little history about string recording:

Violins, violas, cellos and string basses are some of the most perfect acoustic musical instruments. Except for the modification of angling the neck up and rounding the bridge to produce a larger sound from the baroque to the modern classical instrument and some accessory changes such as the substitution of metal for gut strings, the basic design could not be improved upon for centuries. The violin became one of the most favored instruments for virtuosos and audiences.

The first recorded music was made in by Edouard-Leon Scott de Martinville who patented his phonautograph 1857 and recorded Au Clair de la Lune in 1860, however the sounds could not be played back until 2008 while they were only visual lines on paper.

The invention of the telephone in 1876 combined with the invention of the phonograph cylinder by Thomas Edison in 1877, much like the invention of personal computers and the Internet 100 years later, changed the way people communicated and listened to music. The telephone and phonograph created the need for advancements in microphone and speaker technology. Theo Wangemann Thomas Edison's assistant, recorded the first violin. This recording of Beethoven's Spring Sonata played by Herr Kraemer (violin) and Herr Schmalfuß (piano) can be heard on YouTube "Beethoven-the first recording (1889)".

<https://www.youtube.com/watch?v=nmdfSCM1B4o> Incidentally Theo Wangemann also recorded Brahms in 1889. Josef Joachim was first recorded in 1903. The medium for recordings was advanced with the invention of the phonograph record "Gramophone" by Emil Berliner in 1887, but was not in wide use until the turn of the century.

While stringed instruments were perfectly suited to create beautiful music, capturing it on a recording was another matter. It was difficult to record stringed instruments because early microphones consisted of a horn similar to the speakers of the day and the stringed instrument does not produce a directional sound, it is diffused and dispersed in many directions. In early recording sessions, a tuba was often substituted for string bass and inventions such as the Stroh violin were created to produce a more directional sound to capture the sounds of bowed instruments.



Victor Recording Session with Stroh violins



Jan Kubelik

As technology improved so did recordings of stringed instruments. Great microphone advancements in the radio age also created great string recordings. RCA ribbon microphones, which were used to record Jascha Heifetz, are still used in the best recording studios today. These microphones are very valuable and sought after by collectors.



RCA 44 mic



Zoom H1n



iRig



Interface XLR-USB

Audio quality, recording length and playback improved with the introduction in 1948 of the LP record. Magnetic tape, invented in Germany in the 1930's, available to the world after WWII catapulted advancements in editing and multitrack recording. It also created new consumer mediums: cassette, reel-to-reel and 8-track tapes. The digital age of music began in 1975 and created the most rapid, dramatic and far reaching advancements in the history of audio recording. While CD's dominated the consumer audio market until the end of the 20th century, digital audio recording was not easily available because of the difficulty to store large audio files with limited storage capacity of computers of the day. DAT (Digital Audio Tape) and ADAT (Alesis Digital Audio Tape) created hybrid possibilities to remedy this problem. The mp3 invented the 1990's combined with digital signal compression algorithms, which greatly reduced the size of files, created the ability for the public to easily consume and create quality audio files. The innovations such as Apple's media player, larger storage capacities and mobile devices bring us to today where recording possibilities are endless and available to the public.

Professional or consumer recordings?

While a recording studio with great engineers is still the best way to record, now it is possible to create a professional sounding demo with a little know how. To record a violin for instance it is simple: the instrument/player, the room, microphone(s) and placement of the mics are the variables. Before the millennial, it was almost impossible to record quality audio with consumer products. Now consumer products are used for professional audio recording, such as PC's and iMacs. Here are a few things to know to record professional quality audio:

Balanced lines: When using microphones, balanced cables are best. Balanced lines are either XLR -3pin or TRS, double banded 1/4 “ phone plug



XLR 3-pin connector

TRS phone plug

3 pin XLR/ TRS Jack

Mixing board

File Size: WAV, AIFF or Mp3 Refers to the audio file and whether it is compressed. WAV and AIFF files are Microsoft and Apple uncompressed files. An mp3 is a compressed file, less than 1/10th the size of WAV and AIFF. Professional recordings are uncompressed files recorded at a sampling rate of 44.1 kHz or larger. The advantage to record mp3’s, however is the smaller size of the files.

Audio Interface/mixing board/phantom power: An audio interface is a piece of hardware that connects microphones and (guitar, electric instruments) signals to the computer and back. They convert analog signals to digital.

A mixing board connects inputs (mics, instruments) to outputs (speakers, recording devices, effects etc.); they also control volume and EQ. Some audio interfaces are mixing boards and digital mixers are interfaces.

Phantom Power is an external power source that is needed for some condenser microphones. It is important to know if your microphone requires phantom power. Most mixing boards and audio interfaces supply phantom power.

Multitrack Recording: involves separate recording of multiple sound sources. Les Paul invented it in the 1950’s. There are endless uses as it is used for live recordings so each instrument can be edited separately. Or it can be used to record new material onto existing material. While professional analog multitrack equipment still sells for 5 figures, anyone with a Mac or PC or even on a mobile device can now have a digital multitrack studio such as Garageband.

Editing: Once the recording is done it needs to be edited as final product, this could be as simple as trimming the beginning and end of a song or as complicated as spending long hours in the studio with a professional engineer changing the volume, eq, effects and more of every track. In the past with analog tape, even trimming a song was tedious as the recording tape had to literally undergo ‘cut and tape’ by a skilled engineer.

Most important rule when recording audio: To record quality audio it is best to record the input signal as ‘hot’ loud as possible without ‘clipping’ distorting. This will create the best possible recording, however if the signal clips just once it could ruin a recording.

A little about microphones:

It is important to know the difference between unidirectional and omnidirectional microphones. Unidirectional microphones pick up the sound coming from one direction. These microphones are best for live performance amplification because there is less chance of feedback, however they are not best for recording strings as the sound disperses widely. The Shure SM58 is the standard

unidirectional mic and is great for live sound with PA systems. Omnidirectional mics on the other hand are best for string recordings as they pick up all of the nuances of the instruments, but they are not great for the stage as they easily feedback (omnidirectional mics can work well onstage when professional engineers are engaged).

Compromise between pro and consumer recordings: Here are some products to help you create better recordings easily. Computers and mobile devices all have microphones, however an external mic is better. A designated portable audio device such the Zoom H1n Digital Handy Recorder (\$120) is a very good option for recordings as it has good stereo microphones and can record wav files or mp3's. It also uses a (micro) SD card, which can store a great deal of data. It is important to have the option of portable recording equipment, as the room is a great variable to the quality of the recording.

USB microphones such as the Blue Snowball \$50 eliminate the need for an interface, which connects microphones and electronic instruments to the computer. An interface such as the iRig can connect microphones and electric instruments to mobile devices.

A little history about violin amplification



Stroh Violin

Electrify YOUR AUDIENCE

WITH
THE NEW VioLECTRIC
Created by NATIONAL, builders of
"Champion Amplifying Instruments"

"STUFF" SMITH
Hardest of the Swing Violinists...
Famous Club and Radio Entertainer, now Tops
at New York's Famous Onyx Club, says: "It
thrills me to thrill others with this latest
creation in musical instruments."

LOMA COOPER
Concert Violinist...
Says: "Vio-Lectric," the violin that has Everything!—Power! Tone! Quality!"

EVELYN KAY
Popular Violinist...
Who has thrilled thousands of the Radio Audience for Phil Spitalny's popular "Hour of Charm" Program.

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400 S. Peoria, Chicago, Ill.

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Advertisement for the VioLectric made by the National Dobro Corp. featuring Stuff Smith

While amplifier and speaker technology were developing after the invention of the telephone and phonograph. This technology was not ready or available for musical instruments. The Stroh violin invented in 1899 was the first (acoustically) amplified violin (violas and cellos also). They used a horn to produce the sound generated from the strings. While this did project the sound it was not adequate to compete with wind instruments and large dance halls which is one reason the violin did not become a standard jazz instrument.

The following is from the appendix (V. Violin Amplification) of the book "String Groove" Ideas for Improvisation by Edgar Gabriel published in 2001

Three ways to amplify a violin

1. Microphones

Microphones are good if you need only a little amplification. You have to be extra careful about feedback when working with microphones. There are many types of microphones. Here are two commonly microphones types that are used for live applications:

The Microphone on a Stand - This is a good way to amplify if you need only a little boost in volume and you don't want to attach anything to your violin. Unidirectional (picks up sound from one direction) mics are used in this situation. Make sure that you point the mic at the F-hole of your violin. The best mic placement is with the mic above the violin pointed downward. This will pick up the most sound and minimize feedback.

The Shure SM58 is a very good and relatively inexpensive microphone for this application.

A Lavalier Microphone - This is a small microphone which attaches to your violin. It won't harm your instrument if you are careful. Lavaliers can be more effective than standing mics, because they are closer to the instrument. I use a Crown GLM 100

often, because I prefer to play on my acoustic Italian violin whenever possible.

2. Pickups

Pickups, also known as transducers or contact mics are very good if you want to achieve a louder sound. A pickup is an electronic device that attaches to your instrument, usually the bridge. It is actually a type of microphone, but it will only pick

up the sound of the instrument that it's attached to. Depending on the pickup, you can play at very loud volumes and use effects. You still have to be cautious about feedback, but it is less of a problem than with regular microphones. You can use your acoustic violin, but be careful when installing and uninstalling the pickup. For many years, I used a Barcus-Berry pickup and was very happy with it. I have also heard very good results from the Fishman pickups. Some pickups are built right into the bridge. I currently use an L.L. Baggs bridge and it is installed on my second violin.

3. Electric Violins

An electric violin is ideal if you want to play very loud and use effects. Good electric violins also produce little or no feedback. Electric violins have only recently become readily available in music stores. Most electric violins have a very electric sound and do not produce the warm tone and overtones of the acoustic violin. However you can, and should alter your electric violin with the use of effects and amplifiers. I currently use a five-string Zeta Stratos electric violin and it can be heard on the 'String Groove' CD tracks: 4, 8, 10 & 12.

4. Amplifiers

Once you have a mic, pickup or electric violin, you need an amplifier (and speaker) to produce a sound. There are very few amplifiers designed for the violin, however there are countless amplifiers for other instruments that will work very well. I have used guitar and keyboard amplifiers and also PA systems to amplify my violins. Amplifiers come in all different sizes, weights, shapes and power.

Here are some things to consider when choosing an amplifier: How much power? The power is determined by the watts of the amp. You can never have too much power, but consider the size of the amp and how practical it is for you to transport it. Is the amp tube or solid state? I find that tube amps create a very warm sound for the violin, they however require maintenance and are usually more expensive and heavier. Solid state amps require no maintenance and they can sound very good with a violin. I have used many solid state amps over the years and had very

good results with them. Another thing to consider when choosing an amp is the size of the speaker. Different size speakers will create different sounds. It is up to your taste to decide. If you are so inclined, you can use a separate amplifier and speaker cabinet. To amplify your instrument. Many professional musicians opt for this method of amplification, because they can have more control over their sound this way. I have heard good things about digital amplifiers, but I have yet to experience them for myself. I have three amplifiers which I currently use. For small, low volume applications, I use a vintage 1965 Fender Vibro Champ (tube). Like a good violin, vintage tube amplifiers can sound better than new ones. For multipurpose practical applications, I use a Centaur Acoustic PA (solid state). For high quality high volume playing, I use a Mesa Boogie Mark IV (tube), this is the Rolls-Royce of Amplifiers. You can hear the Mesa Boogie on the String Groove CD tracks: 4, 8, 10 & 12.

5. Effects

An effect unit is an electrical device, which is usually placed between the instrument and the amplifier. The effect then processes and changes the sound of the instrument as it is heard through the amplifier.

Typical effects are: reverb, distortion, delay, chorus and flange. Most guitar amplifiers have reverb and distortion already built into their circuitry. Some amplifiers, such as digital amplifiers have more effects built into them. However, many musicians prefer to have the effects separate from their amplifier. This way they can have more control over their sound. Effects can have the form of a foot pedal, or rack-mountable (off of the floor). Also, effect units can include many effects in one unit, this is called a multi-effect unit. Or effects can be purchased separately. Single effect units are usually, but not always, found as foot pedals. One specific type of foot pedal is the wah-wah pedal; you can hear this effect on tracks 4 & 8 of the 'String Groove' CD. On tracks 10 & 12 I use an Alesis Quadraverb rack mountable multi-effect unit.

When I first started to play amplified violin, I used pedal effects and bought each one separately as I could afford it.

Although the information from the String Groove appendix above is more than 15 years old, it is currently relevant. I still used the Centaur and Fender Vibrochamp amps. I haven't used the Mesa Boogie in years because it is very heavy. In 2005, I acquired the fantastic 'Skrull' electric violin handmade by Gary Rickman for me, which is my primary electric violin. I still use the violin with the L.R. Baggs bridge often, however I don't use the Alesis Quadraverb much anymore, instead I use the Boss ME-80 because it is more convenient. Now I am now going back to retro stomp box pedals because of their size and sound. Since the publication of "String Groove" in 2001, new technologies such as portable effects have become available through mobile devices and apps. These apps are designed to simulate specific effects, amplifiers and microphones. An interface between the mobile device and instrument such as the iRig is necessary to access the effects. Even though effects through apps are newer technology, they are not better than the effects they are simulating; they are however, cheaper and more convenient.

This handout is available for download at www.stringgroove.com. An instructional video demonstrating amplified instruments and more is available also on the Amplify your Instrument page: <https://stringgroove.com/amplify-your-instrument>, or search on YouTube: "Amplified Stringed Instruments-String Groove".

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