SoundFonts.it Presents **GS-201** The tape echo reincarnation

Operation Manual

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License

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System Requirements

Minimum System Requirements:

- Microsoft Windows 98se/ME/2000/XP/Vista
- Intel Pentium 3 @ 500 MHz or AMD Athlon @ 500 MHz
- 256 Mb of RAM
- 4 Mb of free disk space
- An ASIO compatible sound card

GS-201 is a VST plug-in, and needs a VST host application to run. We recommend EnergyXT or Hermann Seib's VSThost / SAVIhost.

Installation

Copy the file GS-201.dll (or whatever it may have been renamed to, in case of future updates) to your VSTplugins folder, usually
C:\Program Files\Steinberg\VSTplugin

According to the VST host application you're using, you have to recall this plugin within your open project. For Example, if you're using EnergyXT simply right click in the middle of the main window and choose VST -> GS-201 then connect its input and output to your desired source and destination.

In the case you have bought a license, install it before running GS-201 to prevent it from running in Demo mode. The DEMO version shows a reminder screen at start-up for a few seconds, then it plays a white noise for 2 seconds every 10. No limitations are applied soundwise.
If you want to buy your license, please visit www.SoundFonts.it.

Please note: two versions of the same plugin are supplied. "GS-201.dll" is the regular version which accepts two audio inputs and two audio outputs (albeit being a monoaural sound effect), and "GS-201_mono.dll" accepts 1 input and 1 output. In case you own a license file and you need to use the mono version, you'll have to copy the "GS-201.lic" file to a new one with the name "GS-201_mono.lic".

Basic Concepts

Tape echo effects were invented towards the end of the fifties. Presumably the very first tape echo machine was invented by Charlie Watkins of London, England, in 1958. It was based on a small loop of 1/4" tape onto which audio was recorded by a magnetic head and then read by three separated heads. What was read from the tape was amplified by the internal all-valve circuit and eventually recorded back to the tape, creating the feedback or "sustaining" echo effect. The delay time of the unit was determined by distance of the write head from the read heads, in conjunction with the speed of the tape. Many manufacturers of this era produced their versions of echo machines, mostly based on the magnetic tape system. The famous Binson Echorec was based on a circular drum head with a metallic magnetic stripe. It was used by Pink Floyd at the time of their album "Echoes". Another famous tape echo machine was the Maestro Echoplex, heavily used by pianist Herbie Hancock. Other notable units were the Selmer TruVoice Echo, the Dynacord Echocord, along one of the most famous and widely used from 1973 to present day: the Roland RE-201. This particular model has a tape loop about 4 meters long which is recorded, read and erased continuously. It consists of one erase head, one write head and three pick-up heads, which when combined with the variable speed DC capstan motor allows many different delay configurations. This machine also offers a reverberation effect based on a spring reverb tank. The combination of echo and reverb gives an "ethereal" ambience effect which eventually inspired the engineers so to name it "Space Echo".
Nowadays these machines are very sought after but quite rare to find on the market, and their evaluation increases year after year. There are many aspects that make the tape echo stand out from a modern digital delay. Here are a few of the main features:
1) the unpredictability. A capstan motor is never perfect like a digital clock signal, resulting in slight variations of the delay times and pitched sound.
2) the frequency response and dynamic range. A magnetic tape is not as clean and flat as a digital recording. Especially a loop of tape which is cyclically erased and re-recorded many times in a short time lapse.
3) noise, hum, distortion. Defects that a digital system shouldn't have, sometimes are wanted and can become "musically acceptable".

There is one way only to obtain all of this. To get the real thing.
Actually there's a much affordable and easy alternative: to use an accurate digital simulation.

GS-201 is an accurate simulation of a japanese Tape Echo machine of the early seventies, featuring:

- Distinctive dynamic range and frequency response
- Realistic response to the panel controls
- Motor "wow and flutter"
- Sound degradation and distortion at high feedback levels
- Very natural hum and background tape noise
- Three different kinds of magnetic tape models
- Ultra-low CPU usage
- Easy "MIDI Learn" feature ***New!* v1.1**

Panel Controls

- **Input Left, Input Right:** GS-201 is a monoaural effect but it works for either mono or stereo buses or insert slots. With these two knobs you can set the input volume of the two stereo channels separately.

- **Direct Level, on/off:** The input audio signal is copied to the output unchanged. With this knob you can set its level. Use the little on/off switch to turn on or off the dry signal. More generally, you should turn off the dry signal when using GS-201 on an effect bus (send/return), and leave it on when you're using GS-201 as an insert effect.

- **Mode Selector:** This 12 way rotary selector lets you choose among various combinations of echoes and reverb.
  Modes 1 to 4 exclude the reverb effect, and include the following combinations:
  - 1. First head (shorter delay time)
  - 2. Second head (medium delay time)
  - 3. Third head (longer delay time)
  - 4. Two taps: Second + Third head.

  Modes from 5 to 11 include both the echo and the reverb effect, and are organized as follows:
  - 5. First head (like mode #1)
  - 6. Second head (like mode #2)
  - 7. Third head (like mode #3)
  - 8. Two taps: First + Second head
  - 9. Two taps: Second + Third head (like mode #4)
  - 10. Two taps: First + Third head
  - 11. Three taps: First + Second + Third head

  Mode #12 is "Reverb only" which excludes the echo effect.

- **Repeat Rate:** This knob lets you vary the speed of the capstan motor which leads the tape, consequently changing the overall delay time. Turn it counterclockwise for longer delay times and clockwise for shorter delay times. When moving this knob, a pop-up window will show the actual delay times in milliseconds for all three heads.
  Please refer to the section Frequently Asked Questions for useful tips about this control.

- **Intensity:** With this knob you can choose the quantity of signal to be reproduced and recorded back on the tape, thus affecting the delay feedback level. At high feedback levels the tape echo could engage an infinite feedback with drastic signal degradation.

- **Bass, Treble:** With these two knobs you can adjust the frequency response of the sound output from the tape.

- **Echo Volume, Reverb Volume:** With these two knobs you can adjust the volume of the two effects separately.

- **Power:** This switch turns off or on the effect unit.

- **RT, 456, 468:** This 3-way selector lets you choose between three different kinds of tape used by the echo machine.
  - **RT**: this is the original tape model.
  - **456**: this is the famous "Grand Master" tape model, mostly used for multitrack recorders and not so suitable for these machines. It has a brighter response, a higher gain and less distortion than the

original tape.
    - **468**: this is the famous "Low Print" tape model, mostly used for hi-fi tape decks. Its characteristics are half-way between the RT and the 456 tape models.

You won't notice huge differences between the three tape models in a normal situation. The difference becomes more noticeable with longer feedback levels, especially when the tape goes into the self-oscillation state.

New! v1.1 In version 1.1, when you move a control on the User Interface, a small display appears on the screen showing the current value of the active control. When you move the "Mode Selector" knob, another display shows the tape heads and reverb arrangement based on the active knob position. Passing your mouse pointer over the controls, a pop-up text describes their function.

Tips on using the interface:
- to reset a control to its default value, hold down CTRL and click it;
- for "fine tuning" knob movements, hold down SHIFT while moving the knob;
- all the knobs react to both vertical and horizontal movement;
- hold down the ALT key to activate the circular control of the knobs.

Frequently Asked Questions

1. **How, a digital delay effect with no tempo synchronization?**
   This has been long discussed before the release of this effect. No, no sync. Sorry. Due to the mechanical nature of the original tape echo, talking about "tempo synchronization" would have gone against a purist and accurate simulation. The delay time is prone to slight changes in time, because the capstan motor somehow "flutters" and is never precise like for a digital delay. Under a certain point of view this should be considered a feature rather than a lack.

2. **How can I find the right delay time based on the tempo of the song?**
   There are many ways of finding the right delay time. First of all, imagine to be in 1973 where even the most advanced drum machine then available didn't have a clear tempo display other than a simple knob labeled "tempo". In that case, the right delay time had to be found by ear, that is the easiest way.
   Just to be more precise, it has been measured that the delay times for this particular echo machine were approximately as follows:
   - Head 1, shorter delay time: min. 60ms, max. 165ms
   - Head 2, medium delay time: min. 117ms, max. 324ms
   - Head 3, longer delay time: min. 176ms, max 487ms

   As you may have noticed, the three heads are almost equidistant. That said, according to the magnetic head you're playing, with the "Repeat Rate" knob set at middle you should have a delay time of about 113 ms for Head 1, 220 ms for Head 2 and 331 ms for Head 3. From these values you can move back and forth to find the right delay time you need.

   If you like maths, take your calculator and try this formula for calculating the exact delay time in milliseconds:
   (60 * 1 / tempo) * (4 / time division) or the simplified equation: **240 / tempo / time division**
   where time division is a coefficient with the following values:

Normal		Triplets		Dotted	
1 bar	= 1	1/2t	= 3	1/2d	= 1.333
half bar	= 2	1/4t	= 6	1/4d	= 2.666
1/4	= 4	1/8t	= 12	1/8d	= 5.333
1/8	= 8	1/16t	= 24	1/16d	= 10.666
1/16	= 16	1/32t	= 48	1/32d	= 21.333
1/32	= 32	1/64t	= 96	1/64d	= 42.666
1/64	= 64				

   So if you're looking for the exact delay time for a quarter note on a tempo of 124 bpm, the formula is:
   240 / 124 / 4 = 483 ms, which is equivalent to Head 3 (mode 3 or 7) with repeat rate at minimum.

   Or if you want to play Pink Floyd's "Run Like Hell", you have a tempo of 115 bpm and one eighth note dotted, so you have:
   240 / 115 / 5.333 = 391 ms, which is equivalent to Head 3 (mode 3 or 7) with repeat rate two notches below the middle... more or less.

   Another important consideration must be done about the narrow limits of this echo machine. As you can see, not all time synchronizations become possible, for example you can't have a quarter note at 120 bpm which is exactly half second (500 ms) because the maximum delay time possible is about 487 ms.

3. **I hear a background noise, is there something wrong with my configuration?**
   Nothing wrong. Have you ever heard a tape machine completely noise-free? The background noise is part of the simulation, and covers a very important role because it is always mixed with the incoming audio signal, and has a big influence on the dynamic range of the tape sound, especialy when infinite feedback is engaged.

MIDI CC Mapping

In version 1.1 there's no default MIDI Mapping. You can assign your MIDI controllers to any of the available controls using the MIDI Learn function. It's very easy: just right-click on a knob or switch of your choice. A menu should pop-up. The first item shows the control's name, the second item shows the MIDI CC# currently associated to that control and the last item activates the MIDI Learn status. Click on "MIDI Learn", the tooltip text should say "Waiting for incoming MIDI data...". Now move a knob/slider/whatever on your physical controller. At this point you should see the virtual control following the movements of the physical control. To abort the "wait" state click on the first menu item, and to reset the assigned control (MIDI Forget) click the second menu item.
The MIDI Map is automatically stored when you quit the plugin in a file named "{name_of_the_dll}.dat" located in the same directory where the DLL file resides. This is a plain text file, but please don't edit it manually.

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