EFFEXX RT-1701 Multi FX Module

Owner's manual

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1.) General description of the RT-1701 Multi-FX Module

The RT-1701 "EFFEXX" Multi-FX processor is a DSP-based, Eurorack-compatible effect module with two selectable main effects, a reverb, an input stage with overdrive and a stereo filter/EQ. Of course not all effects have to sound at the same time. Each section can be faded in and out individually. The EQ section can be switched off. The following options are available for the algorithms of the two main effects: Vintage Delay, Tempo Delay, Chorus, Phaser, Flanger, Rotor Cabinet, Pitch Shifter and String Filter.

The effect parameters of the RT-1701 can be automated. To do this, you save several snapshots of effect settings. Later, you can crossfade over a selectable number of these snapshots with an internal LFO or an external modulation source. Parameters of the effect sections can also be controlled by control voltage. The inputs "CONTROL", "SPEED" and "POS" are used for this purpose. We will talk further about control inputs and modulation and sync opportunities inside the descriptions of the parameters below.

1.1.) Basic operating modes

The RT-1701 Multi-FX processor has 6 operating modes:

I. Manual Mode
II. Interpolator Mode
III. EDIT Snapshot Mode
IV. Konfigurations-Edit Mode
V. Memory Mode (Save and load programs)
VI. Photo-Mode

1.1.1 Brief description of the operating modes:

I. Manual-Mode (default after power up or Tap the Mode-Button)

After switching on, the RT-1701 EFFEXX module is in manual mode. The LED above the manual button lights green in this operating mode. In manual mode, the EFFEXX behaves like an analog module. In this mode, you will hear parameter changes directly. This mode is ideal for exploring the sonic possibilities of the Multi FX module. If you are in another mode, simply tap on the Manual-button until the LED above the button lights green.—>page 09

II. Interpolator-Mode (Tap Mode/Shift-button)

After tapping the Manual/Shift-button, the assigned LED lights up red and the Interpolator mode is active. In this mode, everything revolves around the cyclic switching or fading between sound settings(snapshots). Interpolation means that the snapshots are not switched abruptly, but are crossfaded from one setting to the next. The transition can be performed via a control voltage, an internal LFO or the big knob. If you want to go back to Manual mode, tap the Mode/Shift-button again. The LED will turn green. At the moment, the panel's sound settings are reloaded. Note that the current sound of the cycle mode will rarely match the sound of the panel settings. If you want to edit only one of the participating snapshots, switch to the third choice - the Edit Snapshot mode. ->page 20

III. Edit-Snapshot Mode (Hold Mode/Shift-button while selecting the desired snapshot with the Big Knob).

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In this mode, you can edit, save, and delete the snapshots mentioned above. The selection is made by selecting a snapshot while holding down the Mode/Shift-button pressed. The LED of the Mode/Shift-button lights up blue in this mode. The controls are used to edit the selected snapshot. Changes must be stored by pushing the Snap-button. If you want to save the snapshot to another position of the circle, simply select it and press the Snap-button again. In the Edit-Snapshot-mode, the controls operate in „value pick up“-mode. You must turn the parameter knob to the position of the current value in advance before any parameter changes will be processed. —>page 23.

IV. Configuration-Edit-Mode (Hold Mode/Shift-button)

If you hold the Mode/Shift-button longer, you will see an LED animation of a circle that closes from the bottom to the top. As soon as all the LEDs of the circuit lit up and you release the Mode/Shift-button, you have reached the Configuration-Edit submenu. The Mode LED now shines white. In configuration edit mode, you can set various device parameters. This includes for example the general brightness of the LEDs or the color of the snapshot animation etc. —>page 23

V. Memory Mode: Save and load programs (Hold the Memory/TAP-Button)

When you press and hold the Memory button on the left side, you will see an LED animation that closes a circle from bottom to top. As soon as the circle is closed, you have reached the memory mode. The Manual LED will now light purple. In Memory mode, you can store and recall complete oscillator setups (FX settings plus snapshots and animation settings). ->page 24

VI. Photo-Mode (Hold Mode/Shift-Button and tap the TAP-Button)

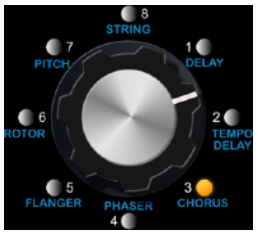
One of the most important activities in the modern synthesizer studio is the creation of Selfies for social networks. In order to display the EFFEXX in the best light, you have the possibility to choose the color of the LEDs individually for a photo and to keep them permanently on. Hold down the Mode-button and tap the Memory-button. Now you can select an LED with the Big Knob and select the color with the Data/Value-knob. Pressing the Mode-button again will exit this mode (The brightness can still be set in the configuration-edit mode).

1.2.) General operating instructions

I. Shift for secondary parameters

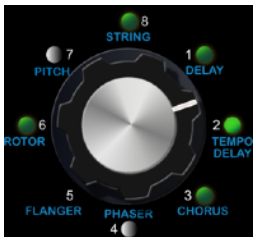
Directly accessible parameters are marked in white. Blue labelled parameters or parameters printed black on blue background can be reached by holding down the SHIFT key.

II. Parameter-Visualization A



When a parameter is set, the LED ring around the Big Knob is used to visualize parameter values. Steps up and down are visualized with a "wandering" of the LED light. Since the LEDs around the Big Knob also represent other things - such as the status and selection of a snapshot memory - they represent the value of a parameter only for a short moment during editing. The LED ring then switches back to the previous view.

III. Parameter-Visualization B



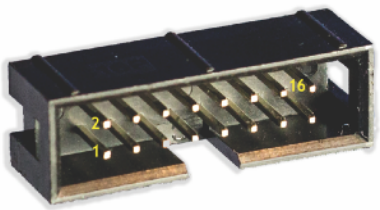
In some menus, the color or brightness of an LED is changed to indicate a status change. As described above, snapshots are selected with the Big Knob in Edit Snapshot mode. The eight LEDs represent the status of the snapshot slots during the selection. Saved Snapshots appear in green color, muted snapshots in red, empty snapshot memories without color, and the selected snapshot lightens the LED color. The table shows the color representation of the LED circle:

Colors of ring LEDs when selecting snapshots:				
Snapshot Status		in use	muted	empty
Status Colors	Before selected.			
	Selected.			

Later, when we look at the possibilities of snapshot interpolation, we will look more closely at the selection, storing, and muting of snapshots.

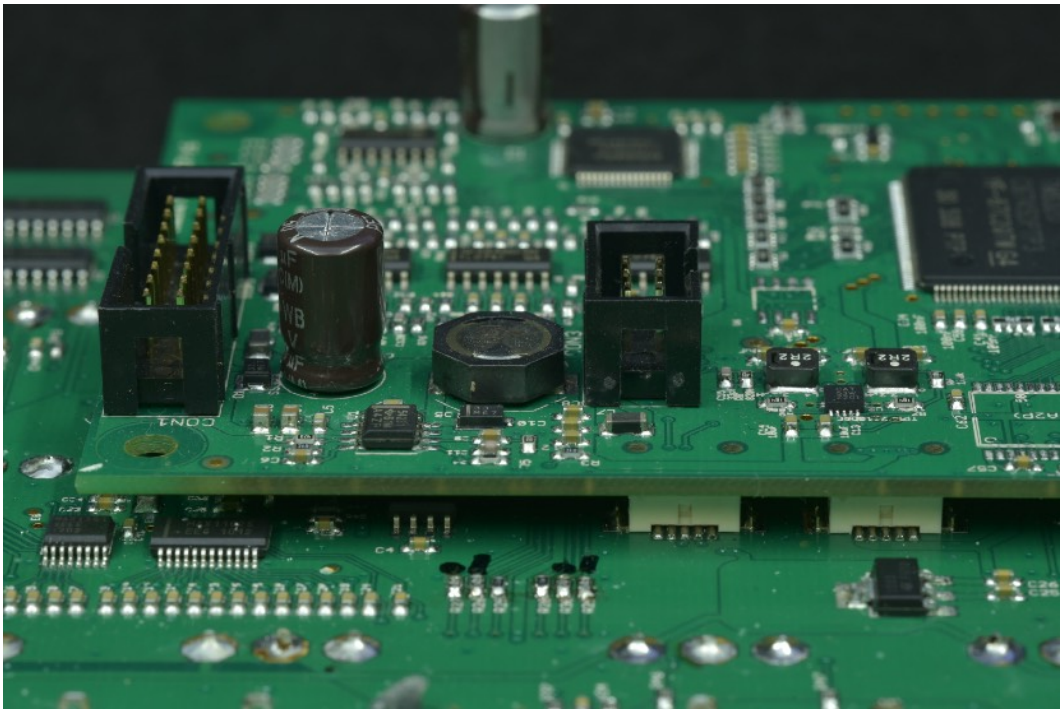
1.3) Installation of the module

Before going into the detailed consideration of the RT-1701 features, we first look at the installation in the Eurorack case or housing.
Before you begin installing the module, you should disconnect the power plug or the power supply!
Next, you will need to measure the power requirements for all modules installed in the enclosure plus the new RT-1701 FX module (12V 250mA, -12V 80mA). To estimate the current consumption, simply sum positive currents of all modules and then all the modules negative currents. The power requirement of all modules should be below the specifications of the housing power supply.



In the Eurorack world a 16-pin IDC connector system has prevailed. In the illustration above you see a typical 16-pin box connector plug, but unfortunately it is not used by all manufacturers. The good thing about such a plug is that you can connect the IDC sockets of a flat ribbon cable only in one direction with the plug. IDC sockets have a "nose", which must be inserted into the box connector as seen above - and of course this only works with correct alignment. But even more important - the delicate pins of this plug connection are protected against mechanical loads with the help of the box. On "bended" follows quickly "break", if one tries to bend the pins into shape multiple times.

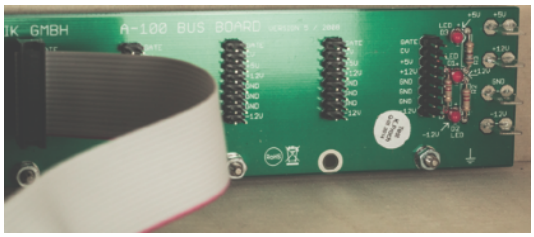
The RT-1701 module consists of two boards, which must be placed on top of each other. The smaller board is the DSP board, the larger carries the controls and is screwed to the front plate. Before installing the module in the Eurorack housing, you must insert the DSP board into the back of the control board. Make sure that all circuit board connectors are straight and have a firm hold.



In the package you will find a special IDC cable, which is equipped with an interference suppression choke. The interference suppression choke is located under the blue shrink sleeve insulation. Please use this cable exclusive for the EFFEXX in order to achieve the best possible signal to noise ratio.

Now take the ribbon cable and insert the side with the shrink-tube insulation into the 16-pin socket of the DSP board. The 16 pin socket is easy to recognize. Make sure that the DSP board is not exposed to unilateral pressure while inserting the cable into the IDC plug, and that the circuit board connectors between the DSP board and the Frontpanel board remain connected.

Now take a look at the power supply bus board of the modular system and the IDC-cable of the new module. The first wire is marked red in the supplied IDC-cable. On the bus board in a Eurorack housing, the lowest two contacts carry -12V. Please ensure that the first wire with the red marking is always connected to the -12 Volt side of the supply bus. Unfortunately, the bus system does not have any polarity protection.



Once you have connected the cable, you can place the module in the correct position and install it using the enclosed screws and washers. Please use the plastic washers - so you can exclude damage to the painting and silkscreening.

If everything has worked out and you have checked the connections, you can turn on the power. After latest 2 seconds a few of the LEDs should light up. If this is not the case, interrupt the current immediately and search for the error. In most cases, however, the Multi-FX module will now work and we can focus on the operation.

2.) The operation in detail

We come to the actual operation. Since it is an effect device, you first need to patch a signal to at least one input and connect the output to a mixer, VCA or an output module to monitor the effects:

1.) RT-1701 Left Input - Connect the left portion of a stereo signal or a mono signal.
2.) RT-1701 Right Input - Connect the right portion of a stereo signal or a mono signal.

When connecting a MONO signal, you only need to use one of the two inputs. The EFFEXX will feed the same signal in to both inputs in case only one cable is inserted.
The inputs of the EFFEXX are designed for levels within the modular system. For the direct connection of microphones and pickups, these inputs are not sensitive enough. For sources like that you need a preamplifier. Use the gain knob on the bottom left to attenuate a too loud signal. While you use the gain control, the LEDs operate as a level indicator. The LEDs remain in the level mode until you use another knob. During operation, the LEDs also function as an override warning display. If the output level permanently and solidly crosses, the entire LED ring in red color. Please note that the input signal is not always the source of the overdrive problem. A high feedback setting in one of the main effects can also lead to overdrives and thus to the warning display.

3.) RT-1701 OUT LEFT -> Left Monitor (Mixer, VCA, Output module etc.)
4.) RT-311 OUT RIGHT -> Right Monitor (Mixer, VCA, Output module etc.)

Both outputs should be connected and gain matched so that you can hear the stereo image. For example, if you are using two inputs on a mixing console, move the pan positions left and right to preserve the stereo impression.

2.1) Manual-Mode

When testing the manual mode, make sure that the Mode/Shift button is lit green. If this is not the case, push the Mode/Shift button until the LED color changes to green. In most cases this is the case anyway or after a tap.

2.2) FX 1 & FX 2 basic settings for effect algorithm exploration

FX1 and FX2 are completely identical. Differences result from the different positions in the signal chain. With up to 8 parameters, you can customize the selected effects according to your own preferences. The parameters are located to the left and right of the center for both effects. The most important parameters are the two Wet/Dry controls at the top of the front panel, as well as the Reverb knob at the bottom right. Use these controls to control the effect level. For the first learning of the various effects algorithms it is worthwhile to hear the first FX

processor alone. To this end, we will now set up a basic setting for the EFFEXX, which will simplify the concentration on the essential.

Step	Basic settings to explore the FX algorithms in FX-Slot 1 exclusive.
1	Turn the Reverb-knob at the bottom right to the left to fade out the reverb.
2	Turn the FX-2 DRY / WET knob to the left to mute FX-2. This knob is the right-hand knob of the group of two at the top center of the front panel.
3	Set the FX-1 DRY/WET knob to the center position. This sits on the left in the group of two.
4	Level the input signal with the INPUT GAIN knob at the bottom left.
5	Make sure the filter or the EQ is turned off. To do this, hold down the SHIFT key and select the center position "OFF" with the SELECT / FREQ knob located directly above the key. The OFF position is indicated by a white LED color at 12 o'clock in the LED circuit.
6	Set the effect routing to serial configuration by keeping the SHIFT button pressed and using the DATA knob to select option 3..
7	As the last action, we select the first effect algorithm for FX-1 to begin testing. To do this, press the SHIFT button again and turn the RATE-FX-SEL knob to the left. The LED 1 will illuminate during the selection as soon as you have reached the algorithm.

In the description of the single effects below, you can always start with the basic settings from 1-6 in the table. The effect selection in step 7 is, of course, different depending on the desired effect. In good light, you can see that the LEDs are labeled with the corresponding algorithm names.

Do not test the delay with a sustained static tone. Use short and percussive signals instead. A delay is always the most exciting, if it has a supply of silence, in which it can accommodate the echo repetitions. With a permanent signal you hardly hear anything from the echoes. If you have built such a patch and can send short signals into the EFFEXX, the game can start. When you move the controls of FX-1, you should be able to hear significant sound changes.

2.2.1) TAP function

The effects of EFFEXX are tempo-based. Both the modulation speed settings as well as the delay times can be set accordingly to the tempo. The easiest way to do this is using the Tap function. You tap the notes of a beat, and from then on, all the selectable note values are adapted to these quarter notes. When you push the TAP button multiple times and force a tempo change, the TAP button LED flashes red. When the TAP function detects that there is no new tempo information, the LED will flash green again. The TAP function is valid for all algorithms running tempo based. Therefore, you do not have to change a found tempo when changing the algorithm.

2.2.2) Vintage Delay

The Vintage Delay is designed to simulate the behavior of tape based echo devices by bending the pitch as the delay time changes. With the Vintage Delay,

you can also select very short delay times to produce feedback flanger alike sound FXs.
Use SHIFT + FX-Select to select the FX algorithm No. 1 "DELAY" - the vintage delay effect. The following parameters are now available:

The parameters of the Vintage Delay	
TIME	Delay-Time.
FEEDBACK	Zeroing the feedback is in the middle of the scale. To the left of the center, the signal is fed back to the input with a phase shift. To the right of the center, the signal is fed back to the input without a phase shift.
RATE	Set the speed of the delay time modulation here.
DEPTH	Adjust the depth of the delay time modulation here.
SHIFT & RATE	*(FX-Algorithm selection)*
SHIFT & Depth	The delay feedback path has a filter to make the echo repetitions thinner or muffled. At values left from the middle the heights are lowered and at values right from the mid position lows are attenuated.
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted.
SHIFT & DRY/ WET	Here you can set whether the echo should only come from the center position of the stereo signal jumps between left and right.

Give this effect a lot of space. Experiment with high feedback times, filtered effect signal, and experiment with increasing and decreasing delay times.

2.2.3) Tempo Delay

The tempo delay is very similar to the vintage delay. But it does not warp the pitch when setting the delay time, and the delay time is fixed to the tempo. With this type of delay, it is particularly easy to adjust the delay time to the tempo of a sequencer or track. Just tap the TAP key in the measure and select the desired note value using the Time parameter. Since the latest update, the delay times can be synchronized to an external quarter clock as well. The TAP function won't work when external sync is activated!

The parameters of the Tempo delay.	
TIME	The Delay-Time quantized to note values.
FEEDBACK	Zeroing the feedback is in the middle of the scale. To the left of the center, the signal is fed back to the input with a phase shift. To the right of the center, the signal is fed back to the input without a phase shift.
RATE	Set the speed of the delay time modulation here.

The parameters of the Tempo delay.	
DEPTH	Adjust the depth of the delay time modulation here.
SHIFT & RATE	*(FX-Algorithm selection)*
SHIFT & Depth	The delay feedback path has a filter to make the echo repetitions thinner or muffled. At values left from the middle the heights are lowered and at values right from the mid position lows are attenuated.
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted.
SHIFT & DRY/ WET	Here you can set whether the echo should only come from the center position of the stereo signal jumps between left and right.
SHIFT & SPEED	Hold Shift and turn the Tempo-knob hard right for external synchronization. The LED ring switches to green color when sync is active. As a proper sync signal the EFFEXX awaits quarter gate pulses at the speed input. The TAP LED will visualize the perceived tempo.

2.2.4) Chorus

A chorus (or ensemble) is a modulation effect used to create a richer, thicker sound and add subtle movement. The effect roughly simulates the slight variations in pitch and timing that occur when multiple performers sing or play the same part.

The parameters of the chorus:	
TIME	Chorus-delay-time.
FEEDBACK	Zeroing the feedback is in the middle of the scale. To the left of the center, the signal is fed back to the input with a phase shift. To the right of the center, the signal is fed back to the input without a phase shift.
RATE	Set the speed of the Chorus modulation here.
DEPTH	Adjust the depth of the chorus modulation here.
SHIFT & RATE	*(FX-Algorithm Selection)*
SHIFT & Depth	-
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted.
SHIFT & DRY/ WET	Here you can adjust the stereo width of the chorus.

2.2.5) Phaser

A phaser is an algorithm used to filter a signal by creating a series of peaks and troughs in the frequency spectrum. The position of the peaks and troughs of the waveform being affected is typically modulated so that they vary over time, creating a sweeping effect. The peaks and troughs are realized with a chain of allpass filters that create multiple phase cancellations in the audio spectrum. The EFFEXX Phaser is by the way a stereo phaser. For the most possible spatial modulation, the frequency modulation of the two all-pass filter chains is shifted relative to one another. This creates the impression that the changes in the sound would wander through space.

The parameters of the phaser.	
TIME	The Allpass filters modulation runs between a lowest and a highest frequency value. Use the Time-knob to adjust the highest frequency value of the allpass filter modulation. That is the highest frequency where phase cancellation occurs.
FEEDBACK	The Allpass filters modulation runs between a lowest and a highest frequency value. Use the Time-knob to adjust the lowest frequency value of the allpass filter modulation. That is the lowest frequency where phase cancellation occurs.
RATE	Set the speed of the phaser modulation here.
DEPTH	-
SHIFT & RATE	*(FX-Algorithm Selection)*
SHIFT & Depth	-
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted.
SHIFT & DRY/ WET	-

2.2.6) Flanger

The flanger is a modulated, very short delay that is shifted only by a few milliseconds from the original signal. This also results in phase cancellation. The effect is intensified by a feedback path (feedback). A flanger with feedback is called a Jet-Flanger, which is probably due to the cutting sound.

The parameters of the Flanger.	
TIME	The Flanger delay time.
FEEDBACK	Zeroing the feedback is in the middle of the scale. To the left of the center, the signal is fed back to the input with a phase shift. To the right of the center, the signal is fed back to the input without a phase shift.
RATE	Set the speed of the flanging modulation here.
DEPTH	Adjust the depth of the chorus modulation here.
SHIFT & RATE	*(FX-Algorithm Selection)*
SHIFT & Depth	-
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted.
SHIFT & DRY/ WET	With the flanger, this parameter has a strong influence on the feedback signal in addition to the stereo impression. Experimentation is expressly desired.

2.2.7) Rotor

The rotor algorithm is a rotor cabinet emulation. In the context of a modular system, this effect is rather a subtle enhancement. It is interesting, however, in conjunction with other modulation effects and reverb to build an impressive evolving texture. There is one loudspeaker for the high frequencies (treble) and one for the lower frequencies (bass). You can adjust both the volume balance and the crossover frequency for both cabinets.

The parameters of the rotor effect.	
TIME	The crossover frequency. Below the set frequency you will hear the bass cabinet and above the treble cabinet.
FEEDBACK	Use the feedback control to control the balance between the treble and bass cabinet.
RATE	Set the rotor speed.
DEPTH	Here you set the stereo width of the rotor movement.
SHIFT & RATE	*(FX-Algorithm selection)*
SHIFT & Depth	-
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted.
SHIFT & DRY/ WET	-

2.2.8) Pitch-Shifter

The pitch shifter can tune the pitch of the input signal in wide ranges. It also sports a LFO that allows for subtle modulation, vibrato effects and extreme pitch modulation. Very popular is also a very slight detuning between original and effect signal. The Pitch Shifter is a mono effect.

The parameters of the pitch shifter.	
TIME	Use the Time knob to adjust the pitch variation. The zero position is in the middle at 12:00. Values to the left shift the pitch of the signal lower than the original pitch and values above the center position shift the pitch higher.
FEEDBACK	-
RATE	Set the speed of the pitch modulation here.
DEPTH	Set the amount of pitch modulation.
SHIFT & RATE	*(FX-Algorithm Selection)*
SHIFT & Depth	-
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted.
SHIFT & DRY/ WET	-

2.2.9) String Filter

The String Filter is a short Delay with a high feedback setting specialized on the creation of self oscillating tones. Inside the feedback loop works a -3dB lowpass filter that damps the higher frequencies. Without that filter, a self resonating tone would persist infinitely. With that filter, the resonating sounds fades out after a while. There are several ways how this algorithm provides good results. But the most popular one is a small noise impulse fed into the delay-line for excitation of the self resonance combined with this filter that damps the oscillation. Lower frequencies can resonate a little bit longer than higher frequencies. For that reason, the sound reminds on plucked string sounds. That is the reason, we called that algorithm „String-Filter“. With this effect, the EFFEXX becomes a virtual instrument. The delay time determines the fundamental frequency of this oscillation and can be controlled via the control control input with 1V/octave characteristic so that the EFFEXX becomes more or less a special oscillator. If you use this effect in the first FX, you can process the sound with a freely selectable effect in FX-2, the reverb and the filter.

Testing the String Filter:
For this example, you need the following modules in addition to the EFFEXX:

1.) Noise Generator
2.) VCA
3.) Envelope Generator

Connect the output of the envelope to the control input of the VCA.
Connect the noise source to the VCA signal input. The output of the VCA is connected to one EFFEXX input. Connect the output of the EFFEXX to the input of a mixing console. Now you need the gate signal of a keyboard or MIDI2CV interface and the control voltage for the pitch control. Set all Envelope parameters to 0 and only the Decay parameter a little bit above 0 to get this really short excitation noise pulse. Connect the gate signal of the keyboard or MIDI2CV Interface to the envelope gate input and the control voltage for the pitch with the CONTROL input of the EFFEXX module. Select the string filter algorithm for the first FX slot. Set the Wet/Dry knob to maximum to suppress the noise signal.

The parameters of the string filter:	
TIME	The time parameter controls the fundamental pitch of the String filter.
FEEDBACK	Zeroing the feedback is in the middle of the scale. To the left of the center, the signal is fed back to the input with a 180 degrees phase shift. To the right of the center, the signal is fed back to the input without a phase shift. Both feedback types result in very different sounds.
RATE	Set the speed of the pitch modulation here.
DEPTH	Set the amount of pitch modulation.
SHIFT & RATE	*(FX-algorithm selection)*
SHIFT & Depth	Controls the oscillation damping by varying the cutoff frequency of the 3dB lowpass.
DRY/WET	This knob controls the dry/wet ratio of the output signal. In the left-hand position, you only hear the dry input signal, in the middle position we have a 50/50 ratio between the original and the effect signal. On the far right, only the effect signal is heard and the original sound is completely muted. For the string filter experiments, it is a good idea to suppress the original signal completely.

The parameters of the string filter:	
SHIFT & DRY/ WET	-

2.3) FX-Routing

The FX routing determines in which order reverb and the two FXs are interconnected. The selection can be done with the DATA control while holding down the SHIFT button. 5 different routing opportunities are available. When you turn the DATA knob while holding down the SHIFT-button, the current selection shows up at the LED ring. At the bottom of the module, the routing options are displayed with small symbols. The following table lists a brief description of the routing options:

\+ \+

Description of the available routing options.	
1	Routing Option 1 routes the input signal to FX-1 and FX-2 simultaneously. Their outputs are mixed together and their sum is fed into the reverb engine.
2	Routing Option 1 routes the input signal to FX-1 and FX-2 simultaneously. FX-2 is fed directly into the output and FX-1 is fed into the reverb before it arrives the output .
3	With routing option 3, we are dealing with the classical series circuit. The input signal successively passes FX-1, FX-2 and the reverb before it goes to the output circuit.
4	Routing option 4 routes the output of FX-1 to both the reverb and the second FX.
5	Routing option 5 is an EFFEXX specialty - but also an exception. For this specialty, choose one of the two delays for FX-1 and add FX-2 to the feedback of that delay. The output of FX-1 leads to the Hall and from there to the output section.

2.4) Reverb Effect

No FX algorithm has had such a large influence on the EFFEXX user interface than the Reverb. Originally the Reverb was found as a selectable algorithm in the FX-1 and FX-2 section. In addition to the EQ and the Overdrive effect, the unit only had two additional DSP effects (FX1 & FX2) instead of three (FX1,FX2 & Reverb). When we realized, that two main FX plus the reverb can be handled by the DSP, we had to make a decision, whether we prefer having no shift functions for the knobs at all and two FXs only, or if it is better to provide shift functions for 2 main FXs & the Reverb simultaneously. The reverb is often the icing on the cake of many FX-Chains. Combining chorus plus delay plus reverb is simply a great combo. To know, that this combo is possible but simply ignoring that for less shift knob actions does not make so much sense. A reverb is just so essential that you should always have the freedom to use its power when polishing the FX chain. So we decided to keep it available in addition to FX-1 and FX-2. We did not want to ban its parameters in an edit menu. In the end, only the Shift key was left to make the parameters available directly on the user interface. The most important parameter - namely, the reverb level control - has even got its own

dedicated knob, so we can at least do without the Shift-button when adjusting the reverb level.

2.4.1) Reverb Parameters

The parameters of the reverb effect are labelled with a black color on a blue background. As indicated in the previous section, you can use the Shift-button as for the secondary function.

The parameters of the reverb effect.		
Shift	Knob:	Function:
X	Rev: Size	Use this knob to set the room size.
X	Rev: Feedback	Use this knob to change the amount of feedback - which basically enhances the room reflections.
X	Rev: Width	Set the stereo width of the reverb effect here.
X	Rev: Damp	Adjust the attenuation of the reverb. Values below the center ensure that the treble fades faster than the bass. Values above the center let the bass frequencies decay more quickly.
X	Rev:Filter	With the filter, you can change the sound characteristics of the reverb sound. Turned to the left, the reverb loses its highs and acts as a black shadow of the original signal. Turning the knob to the right makes the reverb more radiant and loses its foundation.
-	Reverb	This allows you to adjust the amount of reverb without using the Shift key.

2.5) Input Gain and Overdrive

At the bottom left, the first knob is the input volume control for the two audio inputs "Left" and "Right". When you use this knob to adjust the volume of the input signal, the LED ring will work like a level metering. If you exaggerate it and the level becomes too loud, all the LEDs will turn red. You will hardly be able to do this with the input signal alone - but the effects with their feedback functions can lead to a significant increase in the level, which causes internal clipping. Therefore, the level meter will analyze the output and not the input of the effect processor. If you ever stumble over the red LED ring, check the input gain and the feedback paths of the effect algorithms. Please also consider that the filter section also has feedback(Q). In addition to the level adjustment, the input provides an overdrive function, which can also produce dirty sounds. Holding the Shift-Button while turning the gain knob controls the overdrive.

The parameters of the input stage:		
Shift	Knob	Function
	Input Gain	Use this knob to control the input level.
X	Drive	This knob is used to adjust the overdrive level.

2.6) Stereo Post EQ and Synthesizer Filter

At the end of the effect chain, the EFFEXX offers a very flexible filter, which allows for to enhance a sound, that is already good even further. On the other hand it can be used as a stereo synthesizer filter. The frequency of this filter can be controlled with an external control voltage applied to the control input. Feel free to connect an envelope or an LFO to this input. The following filter types are available:

1.) High Shelving-Filter
2.) Bass Shelving-Filter
3.) Peaking Filter
4.) 12dB Lowpass-Filter
5.) 12 dB Highpass-Filter
6.) 12 dB Bandpass-Filter
7.) 12 dB Notch-Filter
8.) Allpass-Filter

The parameters of the Post EQ and the Synthesizer Filter		
Shift	Knob:	Function:
	Freq	You can adjust the filter frequency with the frequency control. The filter frequency can also be controlled via a control voltage, which you have connected to the control input.
X	Select	Use Shift & Select to select the filter type.
	Gain	The gain parameter has an effect on the sound only for the shelving and the peaking filter. All other filters work independent from the Gain setting.
X	Q	With Q, you set the quality for peaking and the shelving filter, and the resonance for synthesizer filters.

The gain parameter affects only the peaking and the shelving filter. The Q-factor and the frequency can be edited for all filter types.

3.) Interpolator-Mode

You might wonder what the word "interpolator" could mean at all. It is a function for continuous fades between sound properties. Imagine an effect device whose sound colors are not switched over, but whose parameter sets are automated to match the settings of the next effect program. In other words, the interpolator is a way to create evolving sound transitions.
The Snapshot blending can be done with the Big knob, with an external control voltage or with an internal LFO. When controlled by a LFO, there are a total of four different playback modes:

1.) Circular interpolating between snapshots.
2.) Smooth commuting of Snapshots.
3.) Quantized Commuting of Snapshots
4.) Circular switching of snapshots.

As you can see, two of the operating modes are basically not crossfading, but rather quantized switching.

3.1) Preparing for snapshot automation

In Interpolator mode, the Big Knob, an LFO oder an external control voltage can be used to load snapshots or to interpolate between snapshot parameter sets. However, these snapshots are created in the manual mode just described above. Therefore we don't leave the manual mode yet, but save a few snapshots first. To do this, simply set the parameters until you are satisfied with the result. Storing snapshots is easy. Use the Big Knob to select a memory location. In this case, already occupied memory spaces appear green, muted red and blank black. Your current selection is displayed with a white LED color. To store the settings on this snapshot, simply press the Snap button once.

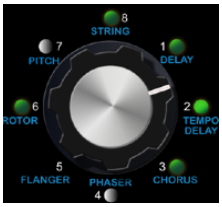
Then edit a FX variation, select a new snapshot memory with the Big knob, and press the Snap-button again. Basically, you need at least two snapshots for snapshot interpolation. If you would like to control the reverb length of an FX program with an external control voltage you first save the basic program into two snapshots. Then you edit the second by increasing the reverb length and overwrite the second snapshot. Now you can control the reverb length with an external control voltage connected to the POS-Input, as soon as you switched into the Interpolator Mode.

3.2) Switch to interpolator mode

After you've placed a few snapshots, you can start recall them or process a transition between them. To do this, push the Mode/Shift-Button once - the Mode LED should now light red. If it does not light red, please press the button a second time.

If there runs already an animation in the LED circle, first turn it off. To do so, set the speed control to the center position and the spread control to the center position at 12:00 and the tempo control also to the midpoint 12:00. Now the animation should have been stopped.

With the Big Knob, you can now access the various snapshots. In the factory default setting, the snapshot selections are processed with soft transitions, which allows many intermediate sounds. The LEDs indicate the transitions with different brightness values.



SPEED Input and Speed-knob

The speed input is intended for the external control of the speed of the cycle interpolator. The input automatically distinguishes between an applied clock and a control voltage.

If the speed of internal LFO operation is not slow enough, you can apply a low control voltage to the Speed input.

If you want to use the interpolator in sync mode, you have the option of activating a clock divider, which brings the speed of the interpolator to the desired speed range. Holding down the Shift key and rotating the Speed knob beyond the center will not only activate the external sync mode. Rather, you also activate in several stages how many external gate signals are necessary to switch the clock of the interpolator one step further. The speed control without the Shift key, on the other hand, selects different note values for the interpolator speed based on the determined tempo setting. This allows the interpolator to be adapted to the most diverse external clocks. 96th notes of a DIN sync clock as well as the clock generated by a step sequencer on 8th notes.

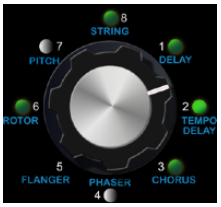
POS

The POS input allows you to process the snapshots transition with a control voltage.

Data/Value

DATA controls the value of a control voltage for external modulation targets. The set value is stored in the snapshots. The control voltage of the Data/Value knob can be read from the Data-output. The control outputs of the data output are either gently faded or hard-switched according to the interpolator settings. A popular application is controlling the filter frequency. But, of course, you can also control a RT-311 Swarm oscillator or a second EFFEXX module and realize even more crazy sound sequences with the help of this control voltage.

Big Knob

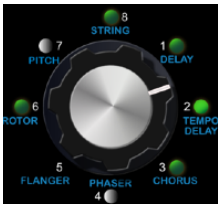


With the Big Knob you can select the different interpolation snapshots. The parameter interpolates between the different snapshots. In the case of a "pendulum" modulation, the position of the controller provides the center point of the motion modulation. The strength of the deflection is controlled by the SPREAD control. If the potentiometer is in the maximum position, the lower and the upper end point can be reached by applying 2.5 volts.

SNAP

If you wish to overwrite the current step, press the Snap key.

MUTE/REMOVE



A step selected with the Big Knob can be switched off and on again with the Mute button. This function does not sound as powerful as it actually is. It greatly changes the character of possible intermediate sounds. The interpolator always fades between two active steps. If there are one or more muted steps between the two active steps, they have no effect on the sound sequence. "Demute" one, the sound again takes a new course. New features in products are always a little startling. But I'm sure you'll appreciate just this functionality. Always keep your other modules in mind. Check the interpolator with an envelope curve, a step sequencer, an S & H

voltage, or a velocity dynamics or an aftertouch. A wide range of dynamically playable sound colors is thereby opened up. You can approach new sound changes just with the aid of the mute, the spread parameter and the circle controller.

DRY/WET-knobs

The DRY/WET knobs control three additional functions in the interpolator mode: In the two "pendulum" settings (Refer to chapter 3.3), you determine over how many snapshots the interpolator runs. Use the Big Knob to set the center position of the pendulum control, and use the Dry/Wet-knob to set the maximum deflection to the right and left of it. By the way, we called "pendulum" with a different name - the "wiper" mode. The position of the Dry/Wet knobs determine the direction in which the pendulum takes place first. To the left of the center, it starts counterclockwise and clockwise from the center. In the standalone operation has of course no meaning. Note, however, that the interpolator LFO can be synchronized.
When one of the two circle animation modes is selected, the Dry/Wet-knobs select the circular movement direction. To the left of 12:00, the interpolator rotates counterclockwise and clockwise clockwise.

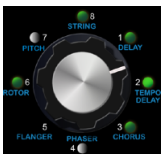
3.3) Switching between pendulous and circular animation modes

When you press and hold the Mode/Shift-Button while setting the Dry/Wet knob, you can choose from four different interpolator modes:

09 o'clock: Circular processing of Snapshot transitions.
11 o'clock: Pendulous processing of Snapshot transitions.
01 o'clock: Pendulous switching of Snapshots.
03 o'clock: Circular switching of Snapshots.

4.) Edit Snapshot Modus

&



Sometimes the interpolator animation is almost perfect but for one or the other snapshot you would like to make fine adjustments. In manual mode, this fine-tuning is hardly possible, because you have to adjust all parameters until the sound in manual mode corresponds to the stored snapshot before you even can begin. For this reason you can edit existing snapshots. To do this, hold down the Mode/Shift-Button and select the desired snapshot with the Big Knob. When you release the Mode/Shift-Button, you entered the Edit Snapshot mode. The LED of the Mode/Shift-Button lights up blue in this mode.

The controls behave differently in Edit Snapshot Mode than in Manual Mode. You will probably get the impression that they do not work at all. But we can calm you down. The controllers have only changed the operating mode. You are now working in the value-pick-up mode. You must first pickup to the stored value of a parameter with the knob and then tweak the parameter beginning from the stored value.

When you have changed all the desired parameters, press the Snap button to save. If, on the other hand, you want to leave the Edit Snapshot mode, or if you wish to discard the changes, press the Mode/Shift button to return to Manual Mode.

4.1) Deleting of Snapshots

In Edit Snapshot mode, you can also completely delete snapshots. To do this, select a snapshot with the Big Knob and press the Mute-button. The selected snapshot is deleted.

5.) Configuration-Edit Mode

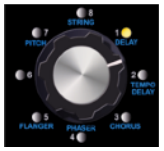
In configuration edit mode, you can set general system parameters. This includes,for example the LED brightness and the LED color of the interpolator LED animation. Calling up the configuration edit menu is very easy. Press and hold the Edit/ Manual-Button. You will then see an LED animation in which the LEDs to the right and left of the Big Knob are displayed ascending. When the animation has been completed, release the Mode/Shift-Button. The LED lights up white in Configuration Mode. In addition, the upper mid LED lights red (12 o'clock). The color should make it easier for you to find the menu items. Each color represents a different configuration parameter. Selected parameters can always be changed with the Data/Value Knob.

5.1) Adjust the LED brightness (red)

The first menu item at 12:00 is the setting of the LED brightness. If desired, you can switch off the LEDs completely here - but this is not recommended if you want to operate the device. Use the Data/Value Knob to adjust the desired brightness.

5.2) Set the LED color for the interpolation mode (yellow)

The next parameter to the right allows you to adjust the LED color in interpolator mode. The color is displayed with the entire LED ring as soon as you turn the Data/Value knob.



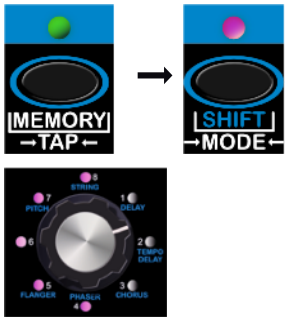
6.) Enable speed input for delaytime and LFO sync

The delay-time of the tempo delay and the modulation FX-LFOs can be synchronized to an external quarter clock. Hold the Shift-button and turn the speed-knob to the right until all LEDs of the ring a lit green. Now the external sync is activated. Feed the quarter clock into the speed input. The perceived tempo can be seen at the TAP-Led. In external sync mode, the Tap-Button is not active anymore.

7.) Save and load programs

The RT-1701 EFFEXX Multi-FX Module not only allows for the storage of individual snapshots, but also the storage and loading of 8 complete programs including the 8 snapshots.

To enter the Memory-Menu, press and hold the Memory/Sync-button. An animation is running in the LED ring as with the call of the Configuration-Menu. When the animation is completed, you can release the button and have reached the Memory-Mode. The Mode/Shift-LED now lights up in a purple color and the already occupied memory areas are also displayed with the color purple in the



LED ring. Unused memory slots are not illuminated. A memory slot selected by the Big Knob lights up considerably brighter than the remaining occupied memory locations. When you move the circle Big Knob, the RT-1701 plays a circular animation sequence with the snapshots stored in the current memory slot. In this case, you have the option of listening to the target memory once again, or selecting a different memory location, if you need to overwrite a memory space.

Press the SNAP key to overwrite the selected memory location.

If you select a memory location and press the Sync/Memory button instead of the Snap button, the selected memory location will be loaded. After loading, the oscillator is automatically in interpolator mode.

If you want to leave the memory menu without saving or loading anything, simply press the Mode/Shift button.

8.) Exchange and archive programs

8 storage is not much and it would be great, if one could archive his sound creations somewhere. Also the exchange of settings with other EFFEXX users could be an interesting additional feature. We also thought about this and gave the RT-1701 a memory dump function. You can always transmit the current ly selected program. The module sends the data via the data output and receives the data via the speed input.
The data is transmitted as a sophisticated audio file. For that reason, you can even record the settings in your DAW. But basically you can also perform the data directly with a cable connection between the two EFFEXX modules or record and play the data with your mobile phone.

To dump the RT-1701 settings, proceed as follows:

1.) Switch to Interpolator-Mode by tapping the Mode/Shift-Button. The Mode/Shift LED must light up red.
2.) Press and hold the Snap button until the LED animation has expired.
3.) Release the snap button.

9.) Technical Specifications

Audio Input:	46,875 KHz, 24 Bit
Audio Output:	46,875 KHz, 24Bit
Control Input:	29,26 KHz, 24 Bit
Control Output:	29,28 KHz, 24 Bit
Gate/Sync:	triggers above 0.5 Vss
Delay RAM	memory: 32 MB
Flash Memory:	2 MB
DSP Speicher:	256kBytes
DSP speed:	360MHz
DSP Core:	3600 MIPS, 2700 MFLOPS
Poti A/D Conversion	10 Bit
Parallel Poti scanning:	3 KHz
Panel Poti update rate:	3 KHz

Power Consumption:

+12V	250 mA
-12V	40 mA
5V	0 mA

Size:
32 HP (160mm), 40 mm tief