RS124

Vintage Compressor

User Guide

Introduction

The Waves RS124 plugin faithfully recreates EMI's legendary RS124, the primary tube compressor used at Abbey Road Studios in the 1960s. While the original device was produced in limited numbers, the Waves RS124 plugin makes the sound of this rare unit available to modern digital audio workstations. The RS124 plugin offers the gain reduction curve, attack or release, and dynamic frequency response of the original hardware. Every parameter matches the behaviors of its vintage counterpart.

A First-Hand Discovery of a Classic Compressor

It was the year 2002, in the control room of Studio Two at Abbey Road, when I first heard the distinctive and downright exciting magic of the **RS124 compressor**. I was assisting the mighty talented producer **Jon Brion** for an album by the similarly brilliant **Fiona Apple** when I was first introduced to the aggressive and beautiful sound of the shamelessly heavily modified Altec 436B compressor.

After the exhausting and, at the time I thought, rather excessive request to personally audition every single valve microphone in the building, Jon asked me if we had any RS124s. At this time, I didn't know what he was talking about. To be fair, the mystic curtain of the RS124 was only publicly lifted once the fantastic *Recording the Beatles* book was published, but as both authors for said book were currently standing with me in Studio Two's control room and the book hadn't yet been written, I can forgive myself for not having a clue what Jon was going on about. My first thought was to ask technical engineer **Lester Smith**, as if anyone would know what this elusive RS124 business was all about, he would be the guy.

I introduced Jon to Lester, along with Brian Kehew and Kevin Ryan (authors of *Recording the Beatles*), and they all hit it off like the Fab Four themselves. Lester said something reassuring like "leave it with me." And, a few hours later, he delivered a single RS124, serial number 60070B, to the control room for a test drive. It turns out Lester had at least three, perhaps more, of these units hidden in one of his many deep cupboards, rescued decades earlier from an almost guaranteed skipping. This might sound crazy, but during the 1980s, that gear was seen as old hat

and of no further use. Luckily, Lester didn't agree with this philosophy, and in some cases actively rescued equipment that might otherwise have been condemned to eternal damnation.

Lester was quite rightly very proud of himself for not only having the foresight to keep these beautiful units under safe lock and key, but also for getting one of the tricky little blighters up and running. He announced to the room it might be a little on the noisy side, but it was in full working order. Without any hesitation, I was quickly instructed to patch in the unit and insert it over the bass guitar channel. Jon—or someone—then proceeded to play said bass guitar and the look on everyone's faces in the room was of total astonishment. Jon simply said, "that is it, that is the sound." Jon was, of course, referring to the sound of Paul McCartney's bass guitar—the sound that has been forever immortalised on some, let's be honest here, pretty famous '60s recordings conducted in the very same room we were all standing in.

It was a memorable session for sure. Lester managed to get three RS124 units fully operational, Kevin and Brian wrote a fabulous book, Fiona Apple had her brilliant songs temporarily delayed by about three years (look it up on Wiki) and I learnt about the Abbey Road engineers' secret weapon of the 1960s: the RS124. I also walked away with a Jon Brion evaluated and approved list of Abbey Road valve microphone serial numbers—handy information to have in your back pocket.

In my personal opinion, I've yet to come up against any compressor that can compete with the character the RS124 produces. I can see why it was referred to as the Abbey Road engineer's secret weapon and used on pretty much every pop recording made at Abbey Road during the 1960s. Only a handful of these beautiful beasts were ever produced. And, unlike the REDD or TG recording gear of the same era, they didn't really make their way to many of the other EMI studios around the world, the exception being one in France and another in Argentina. It's fair to say, these highly modified Altec compressors were very rare indeed.

While we are on the subject of modification, it's worth delving a little deeper into the sometimes-misunderstood history of how these units came to be. Following a recommendation from EMI sister studio Capitol in LA, Abbey Road imported a few Altec compressors for use in the studios in 1959. As was the norm back then, the technical team gave the freshly imported units a thorough going over and decided they didn't really like what they were seeing from the American compression unit, both inside and out, and went about pretty much re-designing it from the

ground up. In fact, the only recognisable feature from the original unit was the Altec badged VU meter on the front panel. By the time the technical boffins had finished with the unit, it was a very different kettle of fish altogether. The units then found their way into the studios and cutting rooms and proved to be rather popular. In fact, I think it's safe to say these little beauties can be credited with playing a major role in defining the sound of Abbey Road during the '60s period. Due to the constant tinkering by the chaps in white lab coats, namely technical legends like **Len Page**, **Bill Livy** and **Mike Batchelor**, no two RS124 units really sounded the same. Each serial number had a different attack or release time; some were more aggressive and became tracking favourites, whilst other more gentle examples were better suited for buss compression and cutting room duties. The RS124 is a unique, rare, and beautiful thing, and I have often heard engineers referring to its sweet, dulcet tones as "creamy"— there is nothing else quite like the RS124 full stop.

I'm so happy we can finally release this magical sound to the next generation of engineers and producers, with our good friends at Waves. There are many flavours to discover in this plug-in, and one thing I can guarantee is you are going to have fun. You will be chasing the ghosts of studio legends as you sculpt and define your sound with these rich sounding gems. Be warned. The vibe from the meticulously modelled RS124 is addictive. Enjoy the journey.

Mirek Stiles

Head of Audio Products, Abbey Road Studios, September 2020

User Interface

The RS124 has two components: mono and stereo.

To keep the plugin interface uncluttered, we've organized the RS124 in two views. The **Collapsed** view shows the classic front panel hardware controls, while the **Expanded** view exposes controls that you may not use every day but are nonetheless important. To move between views, click the Expand or Collapse button.

Mono component
Collapsed view

Mono Component
Expanded view

Stereo component
Expanded view

Controls

Collapsed View, mono or stereo

① EXPAND/COLLAPSE

Click on the button or on the piece of tape that says "Expand" to toggle between the Collapsed and Expanded view.

② AUTO HOLD

The Auto Hold feature reduces compression artifacts when loud attacks are encountered during silence or when low-level noise is boosted due to long release times. RS124 has fairly long attack and release times with lots of makeup gain, so the beginning of a transient may cause an audible thump when applying significant gain reduction

When Auto Hold is engaged, the compressor will analyze the envelope of the transient and smooth the attack. If the signal drops below a certain level, the release will hold to remove the unwanted noise swells.

The hold status has three states as indicated by the auto hold lamp.

Lamp Off	The Auto Hold module is switched off. Click the button to turn the module on or off.
Lamp On Steady	The hold module is on but not currently working. The compression is normal RS124 behavior.
Lamp Flashing	The mechanism is currently working. You can see when it is active.

Auto hold will act automatically only in parts where a loud transient occurs after silence or where a low-level noise occurs at the end of a signal envelope—such as for a drum-room mic decay after a loud hit. The detector will know when to work: just switch it on to activate.

It may be tempting to always leave the auto hold function on, to mitigate problems related to long attack and release times. Note, however, that unnecessary use of auto hold may lessen the RS124's unique sound. If your program material does not have many strong attacks from silence, or incidents where the signal decays into a noisy background, consider automating auto hold **on** or **off** as needed.

3 RECOVERY

The Recovery control sets the release time of the compressor. This is the time taken for the compressor to recover from a state of compression to normal gain when the signal dips below the threshold. It is controlled by this six-position switch. Range: six positions: 1 (fast) to 6 (slow).

4 AUTO MAKEUP

Auto Makeup balances Input Control and the Output Attenuator automatically to deliver stable output levels when Input gain changes.

RS124 has a fixed compression ratio, so compression is governed by the Input setting. Increased Input gain will result in more compression, but also more ouput gain, which requires more attenuation. In the original RS124, the balance between Input and Output Attenuation is adjusted by moving back and forth between these two controls until you achieve the desired compression/gain effect. In the RS124 plugin, **Auto Makeup** coordinates these two controls.

Enable Auto Makeup. As you increase the Input value, the Output will adjust to provide relatively stable overall levels. Lower the Input and the opposite is true.

Considerations when using Auto Makeup:

- The Input knob can influence the Output knob, but not the other way around. This allows you to achieve an ideal balance between Input and Output and then apply a final tweak to the Output gain.

- The motion of the Output knob is not linear with respect to the Input knob. When the Input setting is low, the signal is below the threshold, and it is not being reduced. Hence, no makeup gain is needed. Once you raise Input enough to engage the compressor, the Gain knob will begin to move. When the Iinput level is very high, added Input level will not affect the Output, since the compressor is saturated.

- To readjust the offset between the two controls, turn off Auto Makeup, change the relative values, and turn Auto Makeup back on.

5 INPUT CONTROL

The Input control functions both as an input gain control and a reverse threshold control. Raising the input level increases compression and raises the output level automatically. The Input control ranges from **0** (-inf) to **10** (the actual input level). Lowering the Input setting decreases the level of the original signal and reduces compression. Higher levels result in greater compression and gain—but not beyond the input level.

Over a range of compression from about 2 dB to 15 dB, any change in input level produces approximately half of this change at the output. Below this range, any input change produces an equal change at the output. Above this range, any change in input level produces a smaller and smaller change at the output.

Depending on the level of the input signal, you may find that the Input control and Output attenuator need to be used together to prevent clipping.

6 METER

The meter displays input gain, output gain, or gain reduction, depending on the Meter Select position.
Range (GR): 0 dB to 30 dB
Range: (In or Out): -20 dB to +3 dB

7 METER SELECT (GR)

Sets the Meter display to input gain, output gain, or gain reduction.

⑧ OUTPUT ATTENUATOR

The Output Attenuator provides level attenuation after the gain reduction stage.
Range: -24 dB to +24 dB

⑨ SUPERFUSE

SuperFuse sets the compressor release time to match the attack time. Note that this may result in an over-compressed effect if overused. With SuperFuse active, the recovery control setting is disabled, but all other controls operate as normal. SuperFuse is not a feature of the original EMI hardware: the function is included as an extra feature, to enhance the sonic potential of the RS124 plugin.

⑩ SUPERFUSE ON/OFF LIGHT

The SuperFuse light indicates when SuperFuse mode is active.

⑪ Unit Type

No two RS124 units sounded precisely the same. Over time, tubes "settled in" and an individual unit's personality emerged. Waves modeled the RS124, serial number 60070B, under varied controlled conditions to provide two different types of behavior.

Studio	The **Studio** type is based on the original tubes in the RS124, serial number 60070B at Abbey Road. While not as technically perfect as the EMI specifications, a slightly squashed sound became part of its charm.
Cutter	Certain RS124 units have a slower attack time. Attack and release times are governed by 6AL5 tubes, some of which are slower to respond than others. These slower units found their way into the Abbey Road cutting rooms during the 1960s.

Bottom Section (Expanded View), mono component

① HF Roll-Off

HF Roll-Off reproduces the roll-off that naturally occurs when the RS124 output is sent to tape. It results in a small color difference

② Sidechain High Pass (SC HP)

The **Sidechain High Pass** applies a high pass filter to the sidechain signal, removing unwanted low frequencies that may interfere with sidechain detection. Its range is 20 Hz to 200 Hz.

③ Mix

The **Mix** control sets the wet/dry mix at the plugin output. Range: 0 (dry) to 100 (wet)

Bottom Section (Expanded View), stereo component

1 HF Roll-Off

HF Roll-Off reproduces the roll-off that naturally occurs when the RS124 output is sent to tape. It results in a small color difference

2 Sidechain High Pass (SC HP)

The **Sidechain High Pass** applies a high pass filter to the sidechain signal, removing unwanted low frequencies that may interfere with sidechain detection. Its range is 20 Hz to 200 Hz.

3 Mix

The **Mix** control sets the wet/dry mix at the plugin output. Range: 0 (dry) to 100 (wet)

4 Link

When the left and right channels are linked, all their controls move together. When the channels are not linked, their controls act independently of each other. If the unlinked channels have different values, those offsets will be maintained if the channels are then linked.

⑤ Compressor Type

Sets how the compressor responds to the sidechain signal.

Stereo   The left and right channels are summed in the sidechain. The sidechain values are the same for left and right, so dynamic processing will be applied equally to both channels.

Duo   The left and right channels of the sidechain are processed separately, so dynamic processing may not be the same for the left and right channels.

M/S   The mid and side channels of the sidechain are processed separately, so dynamic processing may not be the same for the mid and side channels.

⑥ Monitor

Use the **Monitor** section to select how audio is monitored, choosing between stereo or mono, left or right, and mid or side.

The WaveSystem Toolbar

Use the bar at the top of the plugin to save and load presets, compare settings, undo and redo steps, and resize the plugin. To learn more, click the icon at the upper-right corner of the window and open the **WaveSystem Guide.**