ACM70SA


Applied Computer Music Technologies Ltd : ACM70SA
ACM70SA
On
Left Channel
Input Gain
Left - Lat
Threshold
Bal
Zero
Bal
Left - Lat
Metering
-20
0
0
10
Time Constant
Left /
Right
Link
Lat /
Vert
AGC
Right Channel
Input Gain
Right - Vert
Threshold
Bal
Zero
Bal
Right - Vert
Metering
-20
0
0
10
Time Constant
Model ACM70SA Limiting Amplifier
ACM70SA

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Section 1 - Introduction

1.1 - What is the ACM70SA?

The ACM70SA plug-in for Windows or Linux PCs and compatible audio workstation applications comprises a vintage compressor / limiter emulation based on the vintage Fairchild 670 units. The ACM70SA provides two independent limiter channels, with a soft-knee characteristic, ranging from 2:1 compression at the threshold progressing to 20:1 at limiting.

1.2 - Main Features

- VST, VST3 and CLAP plug-in for 64Bit Windows or Linux PCs and compatible host applications.
- Feedback design based on Fairchild 670 limiter.
- Soft-knee curve, provides gradual onset of limiting.
- Variable and program dependent release settings.
- Fast attack.
- Variable input gain and threshold.
- Lat / Vert, stereo-linked, or independent (Left / Right) operation.
- Variable-mu AGC emulation

1.3 System Requirements

Windows:
A PC running 64Bit Windows 7 or newer and a VST, VST3 or CLAP compatible host application.

Linux:
An X11 compatible Linux distribution and a Linux VST, VST3 or CLAP compatible host application.

1.4 - About the Manual

This manual covers the installation and use of the ACM70SA limiter. Features and operation may vary depending upon your operating system configuration and host application. Where appropriate, examples are also illustrated with screenshots of the features being discussed.

1.5 - Conventions Used

Access to menu items are shown as follows:

`Menu -> Item -> Item`

A `Mono-spaced font` is used to illustrate commands as they are typed on the command line.

Section 2 - Installation

2.1 Download Contents

Within the folder that contained this manual you will find Windows and Linux folders containing the plug-in built for **64Bit Windows or Linux systems**. Please refer to section 1.3 for system requirements.

2.2a Installing the Plug-In for Windows

Installing the Plug-In for Windows:

Within the Windows folder you will find installers for the VST, VST3 and CLAP plug-ins. The installers will guide you through the steps required to install the plug-ins.

> *NOTE: VST3 and CLAP define specific locations for compatible plug-ins. For Windows this is normally:*
>
> **`Program Files\Common Files\VST3\[CompanyName]`**
>
> *and*
>
> **`Program Files\Common Files\CLAP\[CompanyName]`**
>
> *The installer will permit other locations however you should use only the installer recommended location for the VST3 or CLAP plug-ins. unless you are confident of a specific reason for selecting an alternative.*

The installer will only install the files necessary for the plug-in to function. It will not install anything else on your computer.

Uninstalling the plug-in:

To uninstall the plug-in It is recommended to use

`Control Panel -> Add or Remove Programs`

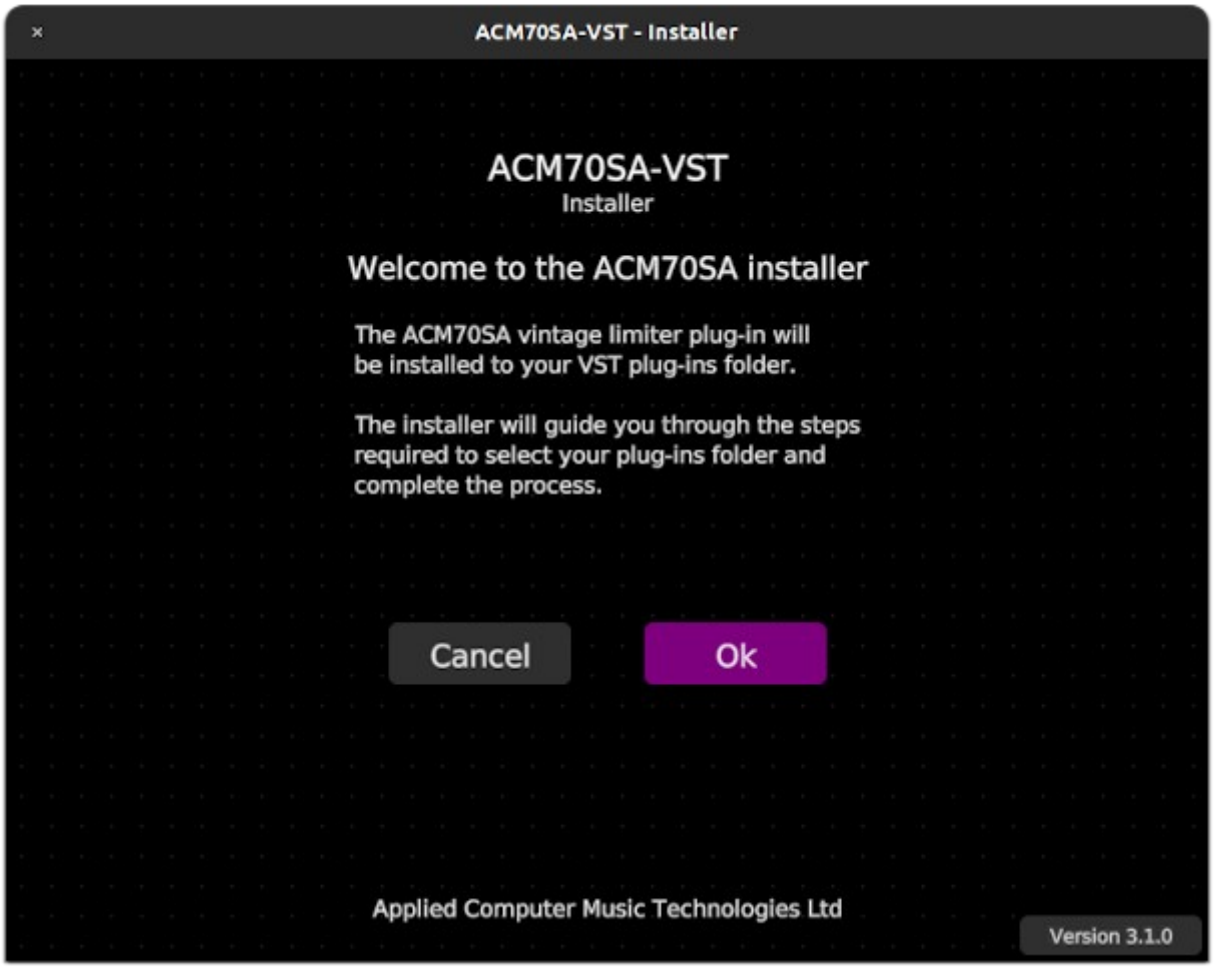
and select **Remove** for the ACM70SA.

2.2b Installing the Plug-In for Linux

Installing the Plug-In for Linux:

Within the Linux folder, you will find the x86-64 folder containing the installer executable.

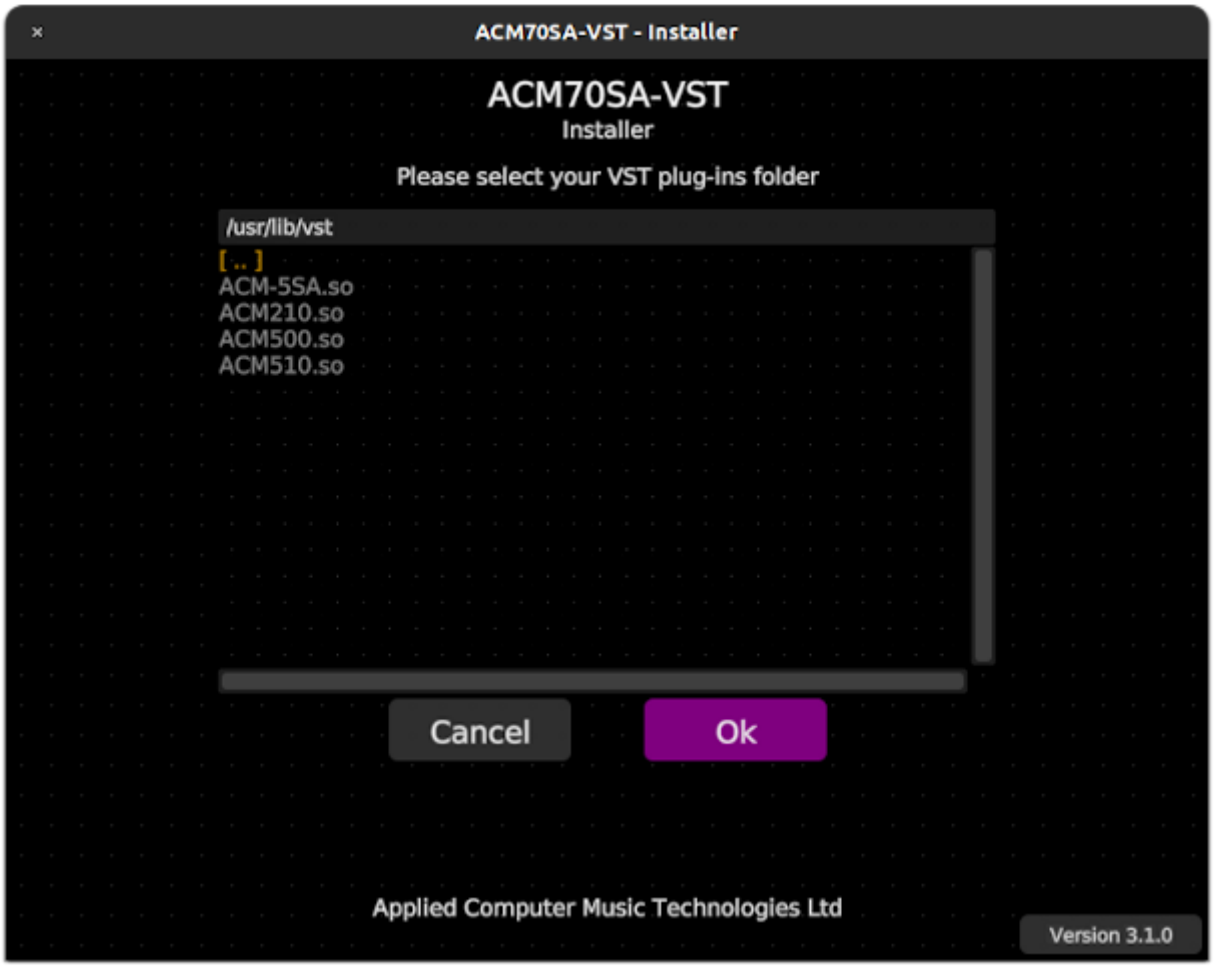
Run the installer executable by (double) clicking it in a file browser, or launching it from the command line. The installer will guide you through the installation process.



Selecting the Install Location:

The installer will prompt for your plug-ins folder location. Normally this will be `/home/your-user-name/.vst` or `.vst3` It is recommended to have a single VST or VST3 plug-ins folder, but you can install the plug-ins to as many different locations as you require (just run the installer again and select a new location).

Depending upon system configuration, you may also be prompted for your user or root password if you attempt to install to a system folder, or one to which you do not have write permissions. The installer uses a standard system authentication process `(pkexec)` and does not directly gain elevated permissions.



Troubleshooting:

The installer is designed to be self-contained and compatible with most Linux distributions, if you need to backup the installer, the single executable file should be all you need. However, due to the varied and customizable nature of Linux distributions, it is possible that the installer may not be compatible with your system configuration. If this happens, follow these steps to isolate the problem or install the plug-ins manually.

1. Do not run the installer as the root / admin user. If you do, there will be a warning message on the console and the installer will exit. The installer is designed to be run as a normal user and will prompt for a password if required.

2. The installer uses the `pkexec` authentication method if attempting to install to a system folder, or one to which the current user does not have write access. (the installer itself never gains root or elevated permissions on your system). If this is not a standard component of your Linux distribution, you will need to correctly install and configure it for your system, or select a different install location with appropriate user access permissions.

3. In some circumstances you may need to mark the installer as 'executable' in order for it to be launched. You can normally do this by right-clicking the installer and selecting:

   `Properties -> Permissions -> Allow executing file as program`

Manually Installing the Plug-In:

If your system configuration is not compatible with the installer, you can install the plug-in manually by copying the required files onto your system. You will need to be familiar with command line operations in order to do this.

The plug-in binary files are contained in the `plug-in_binaries.tar.gz` file within the x86 or x86-64 folders. Extract the archive, and you will find it contains VST and VST3 folders.

The VST and VST3 folders contain the plug-in in Linux VST and VST3 format.

There is also a README file which details how to copy the required files onto your system.

2.3 Product Support

If you are unsure how to install the plug-ins, or encounter problems during the installation, please contact:

support@acmt.co.uk

Section 3 - Operation

3.1 - The Graphical User Interface

This is the ACM70SA front panel. You can control it by clicking and dragging on the knobs or switches. Click on a knob and drag upwards to increase the value (turning it clockwise) or down to decrease the value (turning it anticlockwise). Some controls may have indents – these manifest themselves as areas in the controls rotation where the reluctance to move is increased such that you have to drag a bit 'harder'. They are intended to behave like real controls which may have a 'click stop' at 0dB for example.
You can also move the controls by placing the mouse pointer over them and using the scroll wheel. In this case the centre indent has no effect. The way in which the rotary controls respond to mouse movement may also be affected by host application configuration, as described in the next section.

3.2 Control Modes

The control mode determines the way in which the rotary controls respond to mouse movement. This can normally be configured via the host application preferences. Please refer to your host application documentation for details.

1. Circular

This is the default mode unless changed by host application settings. Clicking on a control will move it immediately to the mouse pointer's angular position. To adjust the control, drag the mouse pointer in a circle or arc.

2. Relative Circular (Default)

Similar to circular mode, however moving the mouse will adjust the control relative to its current setting.

3. Linear

The control responds to vertical movement. Drag up to increase the value, turning the control clockwise, or down to decrease the value, turning the control anticlockwise.

In all modes, double clicking in the centre of a control will return it to its default position.

3.3 - Physically Weighted Controls

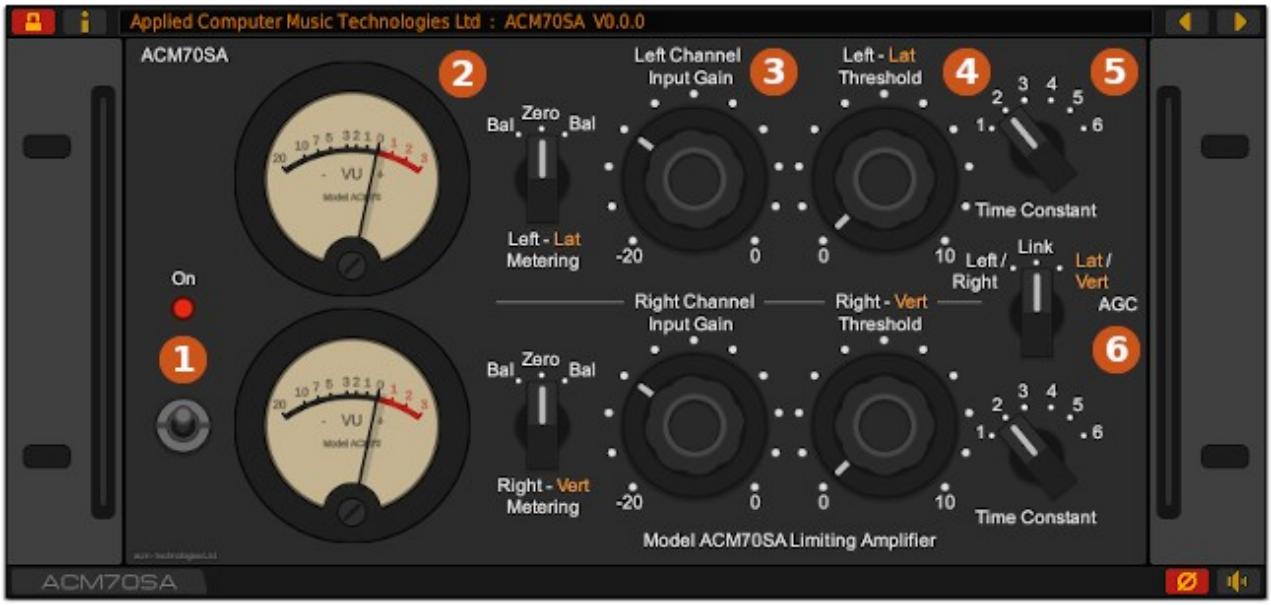
To improve the feel of the controls, and make them behave more as hardware equivalents do, the control knobs have been given a small amount of physical 'inertia'. This weighting does not affect the 'law' of the control, only the way it responds to mouse movement. When you begin to drag on a control, or change direction, its 'gearing' will be at a higher resolution (which also helps to locate more precise settings). As you continue to drag the control, it will become more closely geared to the mouse movement, meaning that you can still make significant control changes without large and awkward movements of the mouse.

As the controls are operated their value will be displayed in the status bar above the front panel. If at any time you need to know a control's setting, just click on the control and its value will appear in the status bar.

As the controls are operated their value will be displayed in the status bar above the front panel. If at any time you need to know a control's setting, just click on its centre and the value will appear in the status bar.

3.4 - The Controls

In common with with the original 670 hardware, the controls may be a little unusual to those used to more modern compressor / limiters, however with a little practice, the controls soon become very intuitive. Possibly the best approach to learning this plug-in is to *'forget all you know about compressors'* - before thoroughly reading the following sections with reference to the annotated front panel below.



The ACM70SA is a stereo compressor / limiter, split into two sections which can either operate independently, or linked. For simplicity, only one channel, the 'Left' or 'Lateral' (see 'Lateral / Vertical' operation later) is described here.

1. In

The 'In' switch places the plug-in in the signal path or implements a clean bypass by 'powering down' the emulation when deselected, allowing audio to pass through the unit unaffected.
As the emulation powers up, there may be a slight delay before the audio becomes processed by the plug-in, however there should not be any interruption to the audio during this time.

2. Meter Select

Each channel has a VU meter which shows the amount of gain reduction, together with a three position switch which determines the meter source*
In the 'zero' position, the meter will show a maximum of approx 20dB gain reduction, deflecting to the left from the '0' point with increasing gain reduction.
In each 'Bal' position, the meter will show the signal current in one half of the balanced variable-u stage. In a hardware implementation this would be used when recalibrating the unit.

3. Channel Input Gain

Each channel has a 20 step input attenuator labelled 'Input Gain'. With the control turned fully anticlockwise, the input signal is reduced by 20dB, progressing in 1dB increments to 0dB with the control turned fully clockwise.
As the variable-mu amplifier stage contributes some gain when there is no limiting, the input control has a default setting of -14dB in order to provide unity gain through the processing.

4. Channel Threshold

Each channel has a threshold control which determines the onset of compression / limiting. With the control fully anticlockwise, no signal passes into the side-chain and the unit functions as a conventional amplifier. As the control is turned clockwise, the threshold at which the control signal begins to turn down the AGC gain becomes progressively lower. At the fully clockwise setting, the onset of gain reduction is at an output of +2dBu (*See the technical specification section for details about reference levels with respect to 0dBFS)*

In this design there is a gradual transition from the onset of gain reduction to maximum limiting, and as such the concept of a precisely defined threshold or ratio is not as it might be in a more modern unit. One of the more pleasing aspects of the design is the way in which the compression ratio increases as the unit is driven with higher signal levels, providing exceptionally transparent gain control.

5. Channel Time Constant

The channel time constant switch selects the side-chain attack and release times. The attack settings are fixed at 0.2 - 0.4ms with the release times becoming progressively longer as the control is advanced through the first four positions.
In positions 5 and 6, the release time is program dependent, which means that for short periods of high level the release time will be fast, however for longer more sustained periods at high level, it will be progressively longer, automatically adjusting the time constant for the prevailing dynamics.

The following table details the specific attack and release times for the six available switch positions:*

Time Constant:	Attack Time	Release Time
1	0.2ms	0.3s
2	0.2ms	0.8s
3	0.4ms	2s
4	0.4ms	5s
5	0.4ms	2s Individual peaks
		10s Multiple peaks
6	0.2ms	0.3s Individual peaks
		10s Multiple peaks
		25s Sustained high output.

**Note: The gain reduction VU Meters are average reading instruments, with defined ballistics. As a result the meters may not accurately represent the true speed with which the side-chain can react at its fastest settings.*

6. Mode Select

The mode switch provides three distinct modes of operation:

Left / Right
In this mode, the plug-in operates as two completely separate compressor / limiters, with the left channel adjusted using the upper set of controls, and the right channel using the lower set

Link
In Linked mode, the plug-in operates as a normal stereo processor, with the same amount of gain reduction applied to left and right channels simultaneously, preventing any stereo image drift.
This was a popular modification to original vintage 670 compressors and is the recommended configuration for stereo processing. In this mode, the other controls should be kept as closely matched as possible between the two channels (unless a specific effect is desired).
If different time constant settings are selected, the side-chain response will be the average of the two channels.

Lat / Vert
Fairchild 670 limiters often found uses in preventing over modulation of disc-cutting lathes during the creation of master recordings for record pressing. The 'Lat' or 'Lateral' refers to the mono channel (lateral motion of the cutting head) and the 'Vert' or 'Vertical' refers to the stereo channel (vertical cutting motion). In modern terms these signals represent the 'Middle' and 'Sides' in a stereo recording.
The Lat / Vert signals are created from a sum and difference matrix of the left and right channels, which are then passed through the two compressor / limiters and finally recombined to produce the left and right outputs. This allows the plug-in to affect the relative levels of 'Middle' and 'Side' information within the stereo image.

Section 4 – System Toolbars

4.1 - Preset Selectors

In addition to the preset selector options provided by the host application, the plug-in has a pair of preset selector buttons to the right of the status display. Pressing the right or left arrows will step up or down through the factory presets and the four user preset memories.

4.2 - Info Button

Clicking on the Info button will open a pop-up showing the current version, together with a product ID code if the plug-in has been activated with a valid key.

4.3 – Demo Indicator

The red lock icon indicates the plug-in has not been activated with a valid key. To unlock the plug-in and remove the demo limitations, click the button to open the demo / activation key pop-up and enter your key (see section 4.2). Once the key is accepted, the lock will change to an open symbol. **You will need to restart the host application to complete the activation process.**

4.4 – Phase / Polarity

The phase / polarity switch causes the signal at the output to be inverted. When switching between inverted and normal settings, or when bypassing the plug-in with the phase invert enabled, there may be a slight interruption to the audio.

4.5 – Output Trim

The level trim adjusts the output by up to +/- 6dB. Click on the control and drag upwards to increase the level or down to decrease. The mouse scroll-wheel can also be used to adjust the level in +/- 3dB steps. Double clicking on the control will return it to its default 0.0dB setting.

Section 5 - Presets

5.1 – Factory Presets

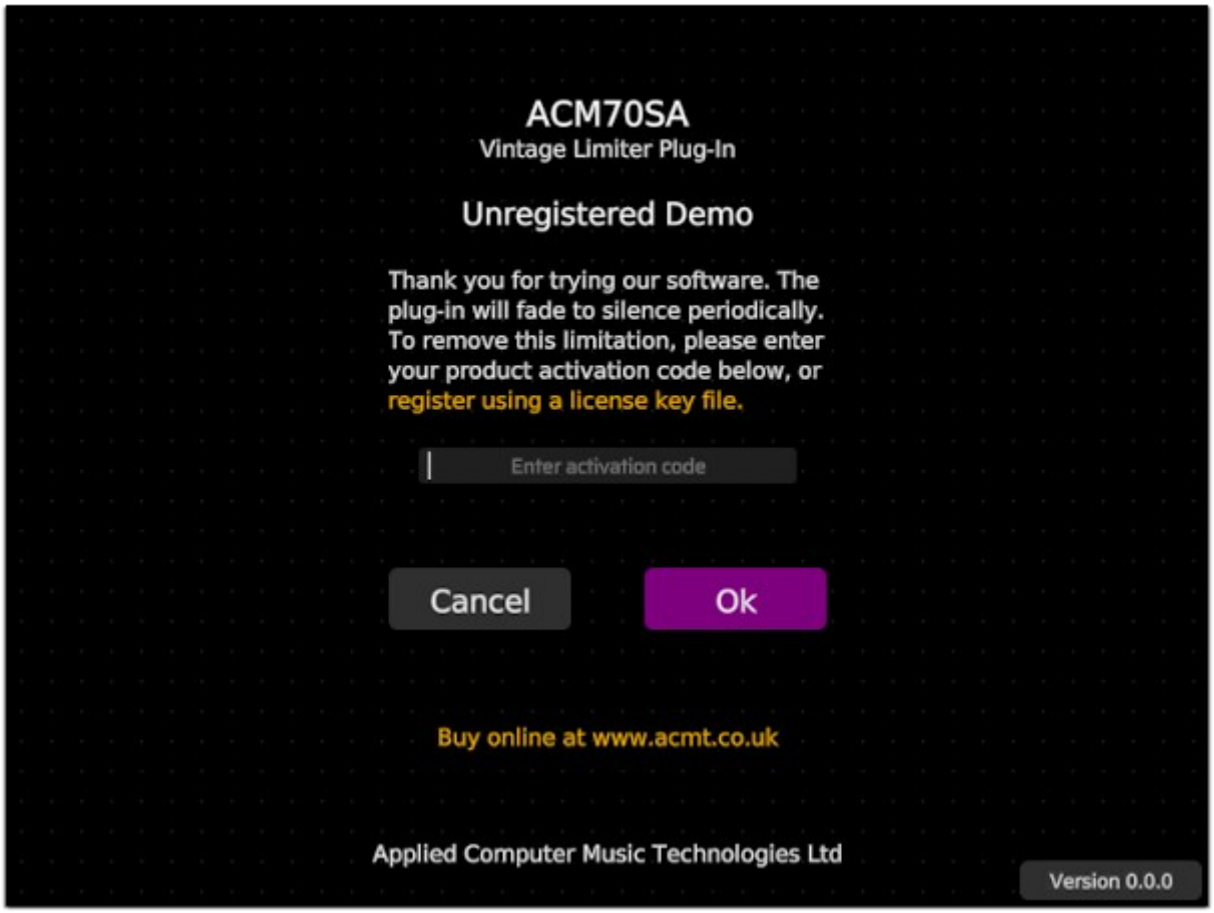
The ACM70SA has five factory presets, designed to provide a guide to some of the more common combinations of control settings.

Factory Preset 1 - Master Buss Light	A gentle master buss compressor setting using Time Constant 2.
Factory Preset 2 - Master Buss Heavy	Similar to preset 1, with a lower threshold setting giving more noticeable compression / limiting.
Factory Preset 3 - Kick Fast	A Kick-Drum compressor setting with fast time constant.
Factory Preset 4 - Vox Smooth	A smooth vocal compressor setting using time constant 3.
Factory Preset 5 - Vox Background	Using Lat / Vert mode to move the centre channel back in the mix.

Section 6 – Demo Limitations

6.1 - Demo Screen

When the plug-in is first added to a channel / buss, the following screen will appear if it has not been activated by a valid key. This indicates the plug-in is running in demo mode and will operate with some limitations. To enable the full functionality you will need to purchase a valid activation key from the Applied Computer Music Technologies website at: https://www.acmt.co.uk



To activate the plug-in, enter your activation code into the text box (you can also paste it from the clipboard by right-clicking and selecting the 'Paste' context pop-up). If you have an existing license key file, click '**register using a license key file**' to select it.

You will need to restart your host application to complete the process. If you do not have a valid key, you can cancel the pop-up and activate it at another time by clicking the lock button in the plug-in's graphical user-interface.

Section 7 - How It Works

The ACM70SA is designed to be a very transparent compressor / limiter, similar to the legendary Fairchild 670 on which it is modelled. The soft-knee compression characteristic is a key component in the sound of this (and the original hardware) device. In order to fully appreciate how to get the best results from the ACM70SA, it is necessary to understand some of the internal design of the unit.

7.1 - Compressor Topology

This compressor / limiter is a *feedback* design. This means that the audio first passes through a variable gain stage, and the *output* of this stage (which is also the output from the compressor) is then passed to the side-chain, which determines the signal level and uses this to apply the appropriate amount of gain reduction above the selected threshold. This means the circuit is continually monitoring its own output and adjusting the gain accordingly.

In contrast, more modern compressors often use a feed-forward design, in which the side-chain monitors the input level and makes adjustments to the gain based on an *assumption* of what is appearing at the output.

The way in which a feedback design reacts to output level changes, including momentary over-compensation is a key component of a compressor's sound.

7.2 - Variable-mu Input Stage

All compressors require some kind of electronically controllable gain stage with which to control the signal level. This is sometimes referred to as a VCA or *Voltage Controlled Amplifier* (although this has come to identify a specific kind of gain control element when talking about compressors).

The 670 used a particular type of amplifier stage known as a variable-mu circuit (mu is often used to represent gain in valve / tube literature). The variable-mu circuit works by using the control voltage to vary the operating point of a special type of valve (tube) amplifier.

7.3 - Balanced Design

Because, in a variable-mu stage, the control voltage is combined with the input signal the significant changes in DC operating level can introduce audible compression / limiting 'thumps' if not carefully considered in the design.
One aspect which sets the 670 design apart from others is the use of a balanced amplifier (and control) stage. By splitting the signal into opposite polarities before passing each through an identical amplifier stage, and then recombining them in the output transformer, the signal is preserved, however any DC introduced by the control signal is removed, resulting in a complete absence of 'thumps' or other DC control voltage artifacts at the output.

This balanced topology is replicated in the ACM70SA emulation.

7.4 - Side-Chain Control Amplifier

In the 670 limiter, the output from the first gain stage is not only presented as the output from the unit, but also fed via the (front panel) AC threshold control to the side-chain control amplifier. The side-chain amplifier is also a balanced design, the first stage being constructed around each half of a 12AX7 valve (tube) which is deliberately biased to 'cut-off' by the 'DC threshold' adjustment.
Normally this would introduce gross crossover distortion into an amplifier, however, in this design it is used to set the threshold above which the tubes begin to amplify and the side-chain begins to operate. The operating point is referred to as 'DC threshold' in the original design and is a preset adjustment inside the unit. In the ACM70SA this is a 'factory set' constant in the software emulation.

7.5 - AC Threshold Control

As previously mentioned, the input to the side-chain amplifier comes via the 'AC threshold' control located on the front panel. This determines the amount of signal entering the side-chain thereby controlling the onset of compression / limiting. Turning the control fully clockwise allows maximum signal into the side-chain and results in the lowest threshold. Turning the control fully anticlockwise allows no signal into the side-chain, and results in no compression / limiting. In this mode the unit is simply a normal amplifier.

The law of this control is approximately logarithmic, and has been modelled to replicate the original 670 design, which, anecdotal evidence suggests, was arrived at by experimentation.

7.6 - DC Threshold Control

This preset adjustment sets the bias point of the first side-chain amplifier stage, and as such also determines the onset of compression / limiting. However, it also indirectly controls the ratio of the compressor. At its minimum setting, compression onset is almost immediate, however the curve is very gradual, whereas at its maximum setting, the threshold is significantly higher, with a much more 'limiter' like function. In the 670 this was a factory setting, determined to give a good compromise between the two extremes, and similarly in the ACM70SA it is a software defined 'constant' chosen to match the factory set hardware.

7.7 - Time Constants

The final stage of the side-chain is the time constant circuit. This is responsible for determining the signal level, converting it to a DC control voltage and imposing the attack and release times on it according to the front panel 'time constant' switch setting.

The 670 limiter (and the ACM70SA) are characterised by a very fast attack time, allowing very quick reaction to high signal levels. In part this is because the original 670 limiter found uses preventing over-modulation of master disc cutting lathes, where even momentary excess signal level could be disastrous. In modern digital recordings, it can be similarly effective in providing a high level output with safety from exceeding the available resolution.

In common with other compressor designs, if high levels of compression are used with very fast attack and release times, the time constant circuit may try to react to individual cycles of low frequency audio rather than the average level. This can cause undesirable modulation of the audio in some cases (typically it manifests as a form of soft-clipping, which in some cases can add extra 'warmth' and may even be advantageous, depending upon the desired effect).

Section 8 - Using the ACM70SA

8.1 - Setting for Unity Gain

Often the first thing which becomes apparent is the lack of a 'make-up' gain control. As with the 670 hardware, typically this requires some extra thinking about the gain structure around the compressor. While this may seem inconvenient, in common with the original, this can be beneficial in encouraging the user to think in different ways, sometimes refreshing the normal approach to a task.

With no limiting (Threshold control fully anticlockwise) the ACM70SA contributes 14dB of gain to the signal.*
In order to set the unit to pass audio at unity gain it is necessary to set the channel input gain controls to -14dB. The controls are adjustable in 1dB steps, and the readout is also given in the status display as the control is adjusted.

8.2 - Setting the Time Constant

As mentioned previously, a time constant setting with fast attack and release can sometimes cause the compressor to react to individual cycles of low frequency audio rather than the average level. The appropriate settings will be determined by the audio being processed, however switch position 2 or 3 is recommended as a starting point, with shorter release times being more appropriate for percussive sounds. If using the compressor in stereo / linked mode, adjust both right *and* left time constants to similar settings.

8.3 - Adjusting the Threshold

Once set to unity gain without limiting, gradually adjust the threshold control(s) clockwise until the desired amount of compression / limiting is applied. This will also reduce the output level (fundamentally the unit is a limiter, designed to stop signals from exceeding the level set by the threshold) which may mean it is necessary to add gain after the compressor e.g. using the channel faders in a DAW.

** The original stereo 670 limiter is quoted at 7dB of gain with no limiting, with the mono 660 providing 16dB of gain. Other emulations, possibly due to aspects of the examples on which they were modelled, provide 14dB. For this reason, this design also provides 14dB of gain at no limiting, which has the added advantage of being more appropriate for modern DAW signal levels.*

8.4 - Adding More Compression

Once the threshold has been set and any extra gain applied, if more / stronger compression is required, it can often be accomplished by increasing the input gain setting. This allows more signal into the compressor, while keeping the threshold constant, which is more equivalent to increasing the ratio on a conventional compressor having automatic make-up gain. Alternatively, the threshold point can be reduced, however this will require adjustment of any channel gain settings in order to compensate for the reduced output level.

NOTE: *Due to the soft-knee characteristic of this design, quite often the unit will be doing more than it appears, without actually 'sounding' like a (more aggressive) compressor. Try to avoid over-compressing in an attempt to provoke more obvious compression / limiting*.

8.5 - Program Dependent Release

In addition to the first four time constant settings which provide fixed attack and release times, positions five and six also provide 'program dependent' release settings. In these modes, an additional time constant is added across the main components (two are added in position six).

The effect of this is that for short periods of high signal level, the unit functions on the primary time constant circuit with correspondingly fast release times. However, for multiple bursts of high level, or more sustained average program level, the extra time constant circuits begin to become active, progressively lengthening the release times.

(The actual effect can be one of 'staged' release times, where the compressor will achieve a gain reduction setting based on the prevailing signal level, reacting quickly to higher than average levels before returning to that dictated by the average).

In position six, the maximum release time can be profoundly long, sometimes as much as 25 seconds.

Section 9 - Understanding The Channel Modes

This compressor / limiter has three modes of operation, understanding the differences between them is key to getting the best results from the plug-in.

9.1 - Independent Stereo Operation (Left / Right)

With the mode switch set to 'Left / Right' the plug-in functions as two completely independent compressor / limiters. The upper set of controls control the 'left' half and the lower set control the 'right' half. The amount of gain reduction applied will be completely independent and determined only by the audio passing through each half.

9.2 Linked Stereo Operation (Linked)

With the mode switch set to 'Linked' the plug–in functions as a conventional stereo compressor / limiter, in which the side-chains are linked in order that the same amount of gain reduction is applied to each channel. This was not an original feature of the Fairchild units, but was a popular modification when stereo recording became the accepted standard. When using the unit in linked mode, ensure the time constant settings are matched on the left and right channels.

9.3 Lateral / Vertical Operation (Lat / Vert)

With the mode switch set to 'Lat / Vert' each compressor channel acts on a different component of the stereo 'image'. The terms 'Lateral' and 'Vertical' refer to the displacement of the cutting head when making master discs. Typically, the Lateral channel referred to the 'mono' information and the Vertical referred to 'stereo'. These are also known as 'Middle' and 'Sides' in a stereo image.

The Lat / Vert signals are produced by combining the left and right channels in a sum and difference matrix (the sum is the lateral channel, the difference is the vertical). Once combined in this way, the two resulting signals are passed through the two compressor / limiter channels before being re-combined in a similar matrix, from which the left and right signals can then be recovered.

The compressor controls can be adjusted to alter the relative levels of lateral and vertical signals. Used with care, this mode can be very effective in moving a vocal or other centrally panned instrument 'forward' or backward in the mix.

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Appendix

Appendix A - Technical Data

1. Technical Specifications

Frequency Response (Bypassed):	0Hz to Fs/2 where Fs is the sample rate.
Compressor Frequency Response:	40Hz to 15kHz (+/-1dB).
Internal Processing:	32bit floating point, 64Bit DSP coefficients and storage.
Reference Level:	0dBu is referenced to -22dBFS*
Dynamic Range:	Limited by internal processing resolution (32bit Floating Point) and progressive limiting (25dBu clipping point).
Threshold:	Adjustable via front panel control from Inf. to a factory set maximum at -20dBFS (+2dBu)
Compression Ratio:	Approx 2:1 at threshold to approx 20:1 maximum (See section 9).
Maximum Input Level:	+16dBu
Onset of Clipping:	+25dBu
Gain:	+14dBu** (no limiting)
Time Constants:	6 position switch variable from 0.2 to 0.4ms attack time and 0.3 to 5 seconds release time (first four switch positions). Program dependent release times in positions 5 and 6.

** The original 670 limiter had a factory set threshold of +2dBu. Clearly it is impractical to convert this to +2dBFS as this is 2dB above the theoretical maximum. Common standards exist for equating dBu to dBFS, the most common European standard being -18dBFS = 0dBu. However empirical evidence suggests that other software emulations which users might be familiar with reference 0dBu to -22dBFS and as such this was chosen here for consistency of user experience.*

*** Available data for the 670 suggests that it has 7dB of gain at no limiting, with the mono 660 unit having 16dB. Evidence suggests that other emulations, perhaps due to the configuration of the particular unit(s) on which they are modelled have 14dB of gain, and as such this was chosen for this design, to conform to user expectations, and advantageously to align more practically with the signal levels commonly encountered in modern DAWs.*

Appendix B - Spare Parts and Service

With regular care and maintenance your new ACM70SA vintage limiter plug-in is designed to give long and reliable service. Spare parts and service updates can be downloaded from:

`https://www.acmt.co.uk`

Always ensure it has adequate ventilation and is kept free from dust. **Always use genuine replacement parts.** For service and support information contact:

`support@acmt.co.uk`

Appendix C – Disclaimer

Disclaimer

All trademarks are the property of their respective owners and are used for information purposes only. References to other companies or their products or representation of those products does not imply any official endorsement of the software by those companies or any affiliation to those companies unless expressly stated otherwise.

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