Rave Generation

PRESENTS

TIME MODULATOR

USER MANUAL

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1. Introduction

Time Modulator is an authentic digital recreation of a legendary 1970s analog delay processor, one of the most sophisticated time-based effects units ever created. Originally designed in the mid-1970s, this iconic unit achieved an unprecedented 95dB signal-to-noise ratio through innovative dual BBD (Bucket Brigade Delay) architecture combined with modified dbx 303 compander technology.

This plugin faithfully recreates the complete signal path of the original unit, including the proprietary ADL-70-D (Dynamic) and ADL-60-S (Static) delay modules, custom-modified dbx 303 compander boards, and the sophisticated internal LFO system. From the warm analog swirl heard on Stevie Wonder's "Songs in the Key of Life" to the otherworldly flanging on David Bowie's "Ashes to Ashes," from the thunderous bass processing on **Queen**'s "Another One Bites the Dust" to the iconic **Darth Vader** voice effects in **Star Wars**, Time Modulator captures the distinctive characteristics that made this legendary processor essential for both musical productions and groundbreaking **sci-fi movie sound effects** throughout the **70s** and **80s**.

Beyond faithful hardware emulation, Time Modulator introduces modern enhancements like comprehensive automation support and professional parameter smoothing. All while maintaining the authentic analog character and complex sonic interactions that defined an era of creative sound design.

2. Key features

Authentic dual BBD architecture
- Reticon SAD1024 BBD simulation with proper 1024-stage characteristics
- ADL-70-D Dynamic Module: Continuously variable 1-25ms primary delay
- ADL-60-S Static Module: Auxiliary delay with stable timing for complex effects
- Voltage-controlled clock generation with anti-aliasing and reconstruction

Modified dbx 303 compander system
- St. Croix's custom modifications optimized for outboard gear applications
- 95dB signal-to-noise ratio with sophisticated encode/decode processing
- Linked compressor/expander operation around delay modules
- Custom VCA filters and RMS detector pre-emphasis circuits

Complete LFO waveform set
- Six authentic waveforms: Sine, Square, Saw, Triangle, SSC, Random
- 0.1-10Hz frequency range with musical voltage control characteristics
- Function mode-specific behavior and waveform shaping
- Dual-phase output for authentic stereo delay modulation

6-Preset system
- Flange presets 1-3: Matched delay ratios inspired by classic flanging configurations
- Delay presets 1-3: Extended delay times for echo and doubling effects
- Carefully tuned delay ranges and time relationships
- Seamless preset switching with parameter interpolation

Three function modes
- Audio Delay: Clean delay mode with extended timing for echo effects- Time Mod: Primary flanging/modulation mode with complex feedback
- Phase Shift: Phase-based effects with quadrature LFO relationships

Authentic LED monitoring
- Time CV Limit LED: Indicates when CV modulation hits limiting rails
- Overload LED: Monitors input level after Input Level control

3. Quick-start

1. Load time modulator on your desired audio track or send

2. Select a preset based on your desired effect:

- Flange 1-3: For classic flanging effects with different sweep ranges

- Delay 1-3: For echo, doubling, and rhythmic delay effects

3. Choose Function Mode:

- Time Mod: For flanging and modulation effects (default)

- Audio Delay: For clean echo and delay effects

- Phase Shift: For phasing and phase-based modulation

4. Set time delay (0-100%): Controls delay time within the preset range

5. Adjust LFO Rate (0.1-10Hz): Sets automatic modulation speed

6. Balance the mix:

- Feed Through: Controls dry signal level (0-100%)

- Delay Out A/B: Controls wet delay levels (0-100%)

7. Add modulation:

- Time CV Att: Blends manual vs. automatic control (0-100%)

- Higher values = more LFO modulation

8. Fine-tune with Feedback (0-100%): Adds resonance and complexity

4. User interface

4.1 Input/output controls

Control	Range	Description
Input Level	-20 to +20 dB	Pre-delay input gain with analog saturation characteristics
Feed Through	0-100%	Dry signal level - higher values emphasize original signal
Feed Back	0-100%	Regenerative feedback amount - creates resonance and complexity
Delay Out A	0-100%	Primary delay (ADL-70-D) output level
Delay Out B	0-100%	Auxiliary delay (ADL-60-S) output level
Master Output	-20 to +20 dB	Final output level control

4.2 Primary delay controls

Control	Range	Description
Time Delay	0-100%	Main delay time within selected preset range
Time CV Att	0-100%	Time CV Attenuator - blends manual vs. modulated control
Preset	6 positions	Selects delay ranges: Flange 1-3, Delay 1-3

Preset ranges (musically optimized configurations):

- **Flange 1**: A=0.2-12ms, B=0.4-25ms - Classic tight flanging
- **Flange 2**: A=0.2-12ms, B=0.8-50ms - Extended flange sweeps
- **Flange 3**: A=0.4-25ms, B=0.8-50ms - Wide-range flanging
- **Delay 1**: A=20-100ms, B=80-200ms - Short echo effects
- **Delay 2**: A=20-100ms, B=80-400ms - Medium delay timing
- **Delay 3**: A=40-200ms, B=80-400ms - Long delay effects

4.3 LFO modulation

Control	Range	Description
LFO Rate	0.1-10.0 Hz	Internal LFO frequency with musical scaling
LFO Shape	6 waveforms	Sine, Square, Saw, Triangle, SSC, Random

LFO Waveform characteristics:

- **Sine**: Smooth, musical flanging sweeps
- **Square**: Abrupt switching between delay times
- **Saw**: Linear ramping sweeps (up or down)
- **Triangle**: Symmetric rise and fall modulation
- **SSC**: St. Croix Special - custom nonlinear curve
- **Random**: Unpredictable modulation for texture effects

4.4 Function modes

Mode	Description	Characteristics
Audio Delay	Clean delay mode	No LFO modulation, extended delay times, clean repeats
Time Mod	Primary modulation mode	Full LFO range, complex feedback, flanging effects
Phase Shift	Phase-based effects	Quadrature LFO relationships, phasing characteristics

4.5 Auxiliary delay system

Control	Range	Description
Aux Delay In	Off/On	Enables auxiliary delay processing (ADL-60-S module)
Aux Delay Range	3 positions	>+10ms / +25ms / +EXT - sets auxiliary delay processing mode

Note: >+10ms and +25ms modes tap from the primary delay buffer, while +EXT feeds the original input signal directly to the auxiliary delay for parallel processing.

Auxiliary delay operation:

- **>+10ms**: Taps 10ms behind primary delay for tripling effects
- **+25ms**: Taps 25ms behind primary delay for complex layering
- **+EXT**: Feeds original input signal directly to auxiliary delay (parallel processing)

4.6 Phase controls

Control	Range	Description
Invert A Phase	Off/On	Phase inversion for Delay A output (default: On)
Invert B Phase	Off/On	Phase inversion for Delay B output (default: Off)

Note: Delay A phase inversion is enabled by default, matching original hardware behavior.

4.7 LED indicators

LED	Function	Activation
OVERLOAD	Input level monitoring	Lights when input exceeds 0dB after Input Level control
TIME CV LIMIT	CV limiting detection	Indicates when modulation hits preset delay range limits

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5. Preset system

The Time Modulator features a comprehensive 6-preset system with carefully tuned delay relationships. Each preset locks the relationship between Delay A and Delay B to specific ratios that have been chosen for musical effectiveness and classic delay/flange characteristics.

Flange presets (1-3)

These presets use short delay times optimized for flanging effects:

Flange 1 - Classic tight flanging with moderate sweep range

- Primary delays: 0.2-12ms
- Auxiliary delays: 0.4-25ms
- Best for: Guitar, vocals, subtle movement

Flange 2 - Extended sweep flanging with wider range

- Primary delays: 0.2-12ms
- Auxiliary delays: 0.8-50ms
- Best for: Synthesizers, dramatic sweeps

Flange 3 - Wide-range flanging for extreme effects

- Primary delays: 0.4-25ms
- Auxiliary delays: 0.8-50ms
- Best for: Special effects, ambient textures

Delay presets (4-6)

These presets use longer delay times for echo and doubling effects:

Delay 1 - Short echo and doubling

- Primary delays: 20-100ms
- Auxiliary delays: 80-200ms
- Best for: Slap-back echo, vocal doubling

Delay 2 - Medium delay timing

- Primary delays: 20-100ms
- Auxiliary delays: 80-400ms
- Best for: Rhythmic delays, ambient effects

Delay 3 - Long delay effects

- Primary delays: 40-200ms
- Auxiliary delays: 80-400ms
- Best for: Echo effects, complex rhythmic patterns

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6. Signal flow & processing

Complete signal chain:

Input → Input Gain → Anti-Aliasing → dbx 303 Encode → Dual BBD Delays (ADL-70-D + ADL-60-S) → dbx 303 Decode → Reconstruction → Function Mode Processing → Mix → Output

Key processing stages:

1. **Input stage**: High-impedance input with gain control and analog saturation
2. **Anti-aliasing**: CCD-optimized filtering prevents aliasing artifacts
3. **dbx 303 encode**: Modified compander boards compress signal for 95dB SNR
4. **BBD processing**: Dual delay modules with voltage-controlled clocks
5. **dbx 303 decode**: Linked expansion restores original dynamics
6. **Reconstruction**: Smooth BBD output with analog warmth
7. **Function mode**: Mode-specific processing and phase relationships
8. **Feedback**: Complex feedback routing with frequency-dependent damping
9. **Mix stage**: Authentic wet/dry balance with phase inversion options

Auxiliary delay system:

The ADL-60-S auxiliary delay can operate in three modes:

- **Tap mode**: Takes signal from primary delay buffer at fixed offsets (>+10ms, +25ms)
- **External mode**: Feeds original input signal directly to auxiliary delay (+EXT)
- **Layered mode**: Processes tapped or original signal through independent delay line

This creates the unit's characteristic effects:

- **Tapped processing** (>+10ms, +25ms): Original + Primary Delay + (Primary Delay Tap → Aux Delay)
- **Parallel processing** (+EXT): Original + Primary Delay + (Original Input → Aux Delay)

7. Tips & tricks

Classic flanging techniques

Subtle movement: Flange 1, Rate 15-25, Time CV Att 20-30%, Feed Back 10-20%

- Perfect for adding life to static sounds without obvious flanging

Jet plane sweeps: Flange 2, Rate 30-50, Time CV Att 60-80%, Feed Back 40-60%

- Classic dramatic flanging heard on countless records

Delay and echo effects

Vocal doubling: Delay 1, Time Delay 25%, Time CV Att 0%, Aux Delay In On

- Creates natural-sounding vocal doubling with slight timing variations

Slap-back echo: Delay 1, Time Delay 40-60%, Feed Back 15-25%, Feed Through 70%

- Classic rockabilly and early rock echo sound

Function mode applications

Audio delay mode:

- Use for clean echo effects without LFO modulation
- Perfect when you want stable delay times
- Ideal for rhythmic delays and doubling

Time mod mode:

- Primary mode for all flanging and modulation effects
- Full LFO control with complex feedback interactions
- Most versatile mode for creative effects

Phase shift mode:

- Creates phaser-like effects using delay modules
- Quadrature LFO relationships for complex phase interactions
- Subtle stereo enhancement and movement

Advanced techniques

Parallel processing: Use 100% wet on a send/return for parallel flanging

- Blend heavily processed signal with dry signal in mix

LFO shape exploration:

- Triangle: Smooth, symmetrical sweeps
- Square: Rhythmic switching effects
- SSC: Unique nonlinear curves for organic movement
- Random: Unpredictable modulation for evolving textures

Feedback sweet spots:

- 10-30%: Subtle resonance and thickness
- 40-60%: Classic flanger resonance
- 70-85%: Dramatic resonant sweeps
- 90%+: Self-oscillation and special effects (use carefully!)

Phase inversion tricks:

- Try different Invert A/B combinations for varying stereo width
- Default setting (A inverted) matches original MTM behavior
- Experiment with both inverted for different phase relationships

Auxiliary delay creativity:

- Use +10ms for subtle tripling effects
- Use +25ms for more obvious layering
- Try +EXT for parallel delay processing (original input to both delay lines)

Preset selection guide

- **Guitar/Bass**: Flange 1-2 for classic analog warmth
- **Synthesizers**: Flange 2-3 for wide sweeps, Delay presets for sequences
- **Vocals**: Flange 1 for subtle movement, Delay 1 for doubling
- **Drums**: Time Mod mode with moderate feedback for rhythmic enhancement
- **Ambient/Pads**: Delay 2-3 with slow LFO rates and high feedback

Avoiding common issues

Feedback control**: Start low and increase gradually - the MTM can self-oscillate!**
CV limiting**: Watch the TIME CV LIMIT LED - when lit, modulation is being clipped**
Phase relationships**: Use Invert controls to find the sweet spot for your material**
Preset context**: Remember that delay ranges change dramatically between presets**

8. Installation & specifications

System requirements

- **Operating System**: macOS 10.13+ or Windows 10+
- **Processor**: Intel Core i5 or equivalent
- **RAM**: 4 GB minimum (8 GB recommended)
- **Plugin Formats**: VST3, AU (macOS)
- **DAW**: Any compatible host (Logic Pro, Ableton Live, Studio One, FL Studio, etc.)

Installation process

1. Download the installer from the official website
2. Run the installer and follow on-screen instructions
3. Launch your DAW and rescan plugins if necessary
4. Locate "Time Modulator" in your plugin list

Troubleshooting

- **Plugin not appearing**: Ensure plugin path is correct in your DAW settings
- **High CPU usage**: Reduce buffer size or disable unused auxiliary delay processing
- **Activation issues**: Check internet connection and license key accuracy
- **Unexpected sounds**: Check feedback levels and preset selection

Technical specifications

Sample rates: Supports all standard sample rates (44.1-192 kHz)

- BBD characteristics and filters auto-adjust to sample rate
- Authentic delay timing maintained across all rates

Internal resolution: 64-bit floating-point processing

- Ensures low noise floor matching original 95dB specification
- No audible truncation or quantization artifacts

Latency: Minimal processing delay (typically <5ms)

- Feed-forward design with optimized filter networks
- Real-time parameter changes without artifacts

Formats: Available as VST3 (Windows/macOS) and AU (macOS)

CPU Usage: Optimized for real-time performance

For more resources, updates, and preset packs, visit **ravegeneration.io**.