DOMINION X SED
Operating Manual
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**Note:** We have included schematic views of the described sections for better understanding. All names of controls, switches and jacks are printed bold and are exactly spelled as labeled on the unit.
GENERAL
DOMINION X SED is a monophonic analogue synthesizer. It offers all the benefits and quality of former and current MFB-synthesizers. In addition, it adds advanced circuits, extended functions and a new designed enclosure. This way, DOMINION X SED offers even more versatile sounds and useful features for live-performances. Among its most important characteristics are a threefold oscillator section, a new designed multimode filter with two separate filter circuits, 128 memory locations, MIDI and CV/Gate-control plus additional control inputs to connect analogue sequencers and modular synthesizer systems.

SETUP
DOMINION X SED is powered by the included 12 volts power supply. Connect the power supply to the unit's rear panel POWER input. Make sure to connect DOMINION X SED's AUDIO OUT to a mixing console, an audio-interface or an amplifier before switching on. Press ON/OFF to switch DOMINION X SED on and off.

The synthesizer is controlled by MIDI or its CV/Gate inputs. Connect the MIDI IN input to the MIDI-output of a keyboard or a computer MIDI-interface. Alternatively, use inputs CV VCO1 (as well as VCO2 and VCO3) and GATE to connect an analogue sequencer or an analogue CV/Gate keyboard.

Note: DOMINION X SED uses analogue circuits. It is therefore recommended to "warm up" the unit for 5 to 10 minutes to ensure solid tuning.
OSCILLATORS
All oscillators in DOMINION X SED are voltage controlled (VCO) with equal functions. Differences are found for the Tune/Interval controls and for ring modulation. All described functions are valid likewise for VCO1, VCO2 and VCO3.

Use the four-stage selector Wave to choose the waveform. Available choices are triangle, saw tooth, square and ring modulation. When set to Ring, the oscillators ring-modulate each other as follows:

VCO1 – VCO1 <> VCO2
VCO2 – VCO2 <> VCO3
VCO3 – VCO3 <> VCO2

Tune for VCO1 sets the general tuning of all three oscillators. The available range is approx. ±6 semi tones.

VCO2 and VCO3’s Interval controls set the tuning for the respective oscillators. The range is approx. ±13 semi tones, allowing to detune by little more than a full additional octave.

Use the four-stage selector Octave to adjust the octave range for each oscillator. Select between 32’, 16’, 8’, 4’.
Each VCO can individually be modulated. **Mod VCO** adjusts the respective modulation intensity whereas the modulation target depends on the setting of the **Select** control.

The six-stage selector **Select** allows choosing a specific modulation path for the corresponding oscillator.

Available are:
- **Level** – pre-mixer level modulation by LFO1
- **Pitch1** – pitch modulation by LFO1
- **Pitch2** – pitch modulation by LFO2
- **ADSR1** – pitch modulation by first envelope (ADSR1)
- **PWM** – modulation of waveform symmetry by LFO1
- **PW** – manual modulation of waveform symmetry by **Mod VCO** control

**Explanation**

The VCO’s waveform symmetry can by modulated periodically by LFO1 using the **PWM** function. Manual modulation is possible with the selector set to **PW**. The waveforms by using **Mod VCO** change as follows (fully left to fully right):

- Triangle – triangle to sine wave
- Saw Tooth – saw tooth to triangle wave
- Square – variable pulse width between 50-95% (center: approx. 75%)
OSCILLATOR–SYNC
All three oscillators can be hard-synced. Here, the main oscillator will dictate its pitch to the synced partner. I.e. whenever the main oscillator changes phase (zero pass), the synced oscillator is forced to do the same. By changing the client oscillator’s pitch using interval or by modulation, the spectrum will drastically change.

The best settings for typical sync-sounds are Pitch1/2 and ADSR1 selected for the modulation path (using Select). In DOMINION X SED, VCO1 always acts as main-oscillator. However, an external signal can also be used. Use the four-stage selector Sync to set the synchronized target.

OFF – no synchronization
VCO2 – will be synchronized to VCO1
VCO3 – will be synchronized to VCO1
VCO2+3 – will both be synchronized to VCO1

OSCILLATOR–FM
VCO1 and VCO2 can be modulated in pitch by VCO3. Depending on the setting and frequency-ratio, this results in metallic and atonal sounds. Use the four-stage selector FM to choose the modulation target.

OFF – no frequency modulation
VCO1 – will be modulated by VCO3
VCO2 – will be modulated by VCO3
VCO1+2 – will both be modulated by VCO3

Freq Mod sets the amount/intensity of the frequency modulation.
MIXER
Controls VCO1, VCO2 and VCO3 set the oscillators' output level, prior entering the filter stage. With all controls set to full level, the filter input will be slightly overdriven.

Noise/Ext adjusts the level of the internal noise generator (white noise). The input labeled Mixer will overrule the noise generator and replace its signal with the audio signal fed in here. The corresponding control will then set the level for the external audio signal.

FEEDBACK
The Feedback control will adjust the amount of signal that is fed from the audio output back into the filter's input. This feedback path leads to distortion and will also influence the different filter types' resonance behavior.
FILTER
DOMINON X SED offers two filter circuits. One being the well-known MFB multimode filter with 12db/oct. slope, characterized by low distortion and constant resonance behavior. The other circuit is the SED filter with 12- and 24dB low pass modes. This filter has a nonlinear resonance and is more sensitive to overdrive. Note that the filters' cutoff frequencies are slightly shifted against each other. Use **Select** to choose between filter modes:

- **LP1** – 24dB/oct. low pass filter SED
- **LP2** – 12dB/oct. low pass filter SED
- **LP3** – 12dB/oct. low pass filter
- **BP** – 12dB/oct. band pass filter (2 x 6dB/oct.)
- **Notch** – 12dB/oct. band reject filter (2 x 6dB/cct.)
- **HP** – 12dB/oct. high pass filter

The filter's cutoff frequency is set using the **Cutoff** control. **Resonance** adjusts the filter's resonance which can reach self-oscillation in all modes. Pressing **Key** will activate the key-follow-function where the cutoff frequency will follow the played notes:

- LED off – key-follow amount 0%
- LED lit slightly – key-follow set to 50%
- LED fully lit – key-follow amount 100%

The **Contour** control sets the modulations intensity of envelope 1 towards the cutoff frequency. Press **Inverse** to apply negative modulation. The LED is lit in this mode.
FILTER–MODULATION
In addition to the manual control of the cutoff frequency using the Cutoff control and envelope 1 modulation, other sources may also be used for modulation.
Use the four-stage selector Select to set the modulation source for Cutoff. Available sources are LFO1, LFO2, VCO2 or VCO3. The Mod VCF control sets the amount of modulation.

ENVELOPES
DOMINION X SED offers two ADSR-envelopes. Envelope ADSR1 is permanently connected to control the filter's cutoff frequency with its modulation intensity being controlled by the Contour knob. In addition, this envelope can also be used to modulate one or several oscillators by setting the VCO > Select switch to the respective position.
Envelope ADSR2 is exclusively dedicated to the VCA and therefore controls the output volume.

Note: The envelopes' speed can be switched between a normal and slower mode that reduces times by a factor of four (see page 14).
LFOs
LFO1 and LFO2 offer equal functions. The **Rate** control sets the speed within a range of approx. 0.1Hz to 100Hz.
Use the six-stage selector **Wave** to choose the modulation waveform. Available are sine, triangle, descending saw tooth, ascending saw tooth, square as well as sample & hold.

Press **Reset** to determine whether the LFO-waveform is restarted with every incoming MIDI-note:

- LED off – free running LFO
- LED green – the LFO waveform cycle starts with each incoming MIDI-note
- LED red – free running LFO, the speed depends upon incoming MIDI-notes (higher notes > higher LFO speed)
- LED green/red – the LFO waveform cycle starts with every incoming MIDI-note, the speed also depends upon incoming MIDI-notes (higher notes > higher LFO speed)

Both LFOs can be switched in their global speeds as well as between normal cyclic and one-shot modes (see page 14/LFO and page 16/Reset).

**MOD-LFO**
The **MOD**-LFO utilizes a triangle waveform and works in dependence of a keyboard’s modulation wheel respectively MIDI controller CC#1. The higher the modulation wheel’s output value, the higher the modulation intensity.
Use the six-stage selector **Select** to set the modulation target:

**VCO** – pitch of all three oscillators  
**VCO2** – pitch of **VCO2** (e.g. for sync)  
**VCO2+3** – pitch of both **VCO2** and **VCO3**  
**VCF** – filter cutoff frequency  
**VCA** – output volume

The **Rate** control sets the LFO speed. When set to **OFF** position, there will be no LFO modulation. Here, the modulation wheel will be used to manually control the targeted parameter. Note, that in this case, the last LFO value will define the modulation maximum. This value may also be negative, resulting in an inverse modulation.

**MASTER**  
The **Master** control sets the overall output level.
PROGRAMMING
DOMINION X SED's programming section serves several duties. The selector allows choosing the system settings as well as a routing of MIDI velocity data to up to seven simultaneous targets.
The Value control sets the respective modulation intensities and is also used to specify parameter values.

VELOCITY–ROUTING
The keyboard's velocity can be routed to up to seven target parameters. These are selected with the selector's positions VCA to ADSR. Each target parameter can be modulated with individual intensity. With a value of 00 displayed, no modulation is carried out. All other values are added or subtracted (for negative values) to the current positions of the targeted parameters. All settings are stored with the preset.

VCA – addresses the output level (-63 to 63)
VCF – addresses the filter's cutoff frequency (-63 to 63)
Reso – addresses the filter's resonance (-63 to 63)
Cont – addresses the modulation intensity of Contour, i.e. the filter's modulation by ADSR1 (-15 to 15)
LFO – addresses the LFOs’ speed (-63 to 63). Toggle between the two LFOs by pressing Enter. With the left display dot lit, velocity data are routed to LFO1, with the center display dot lit; velocity data are routed to LFO2.

This menu allows switching both LFOs between normal speed and a slower mode (by factor 4). Press Enter until the right display dot is lights up. Now, use Value switch between F5t (fast) and SLo (slow). The setting is valid for both LFOs.

VCO – modulates the VCO-waveforms’ symmetry (Mod VCO > PM) (-63 to 63). Toggle between the three VCOs by pressing Enter. With the left display dot lit, VCO1 is selected; the center display has VCO2 selected, the right display dot VCO3.

ADSR – modulates Attack, Decay and Release of the envelopes (-15 to 15). Toggle between the two envelopes by pressing Enter. With the left display dot lit, ADSR1 is selected; with the center display lit ADSR2 is selected. Note that this modulation works inverted. Higher values shorten the envelope times.

This menu allows switching both envelopes between normal speed and a slower mode (by factor 4). Press Enter until the right display dot is lights up. Now, use Value switch between F5t (fast) and SLo (slow). The setting is valid for both envelopes.

Note: In combination with a filter-modulation, you may imitate an accent function, comparable to the one found in Roland's TB-303.
SYSTEM SETTINGS
The additional selector positions in the program section are dedicated to define system settings and to perform preset selections. Use the Value control to enter the parameter values and confirm your entries by pressing Enter.

User – selecting presets
DOMINION X SED offers four banks A, b, C, d with 32 memory locations each, named AO1 to d32. Switching between banks is possible by selecting Ann, bnn, Cnn or dnn, available at the very end of the Value control’s range. Press Enter to confirm your entry - all three display dots will be lit.
Select the desired preset 01 to 32 within this bank next, using the Value control. Confirm your selection and load the preset by pressing Enter.
Turning the Value control fully left, Pot will be displayed. Here, the sound represents the current settings of the unit. When loading a preset, the controls' positions do not match with the parameters' stored values. Therefore, edits will only be noticeable when changing the controls significantly.

User – saving presets
Press Store to save an edited sound. The right display dot will light up. In case you want to store the sound to another memory location, select the desired bank and location as described earlier. Press Store twice (center and left display dots will light up) to complete the procedure.

MIDI – this function (left display dot lit) serves to define the MIDI-channel (1 to 16). To change the MIDI-channel, select a new channel using the Value control. The new channel is immediately active and need no confirmation.
**Trig** – this function selects the trigger-behavior for notes played legato. When set to **ON**, retriggering is active. This means that legato played notes will always trigger the envelopes whenever a key is pressed. When set to **OFF**, retriggering is inactive. Here, legato played notes will not trigger the envelopes.

**Glide** – this function offers three subcategories that can be switched by pressing **Enter**. The parameters are selected using the **Value** control. The actual glide-time is set with the dedicated **Glide** control.

**Glide type** (left display dot lit)
- **t-çı** – time-constant, i.e. the glide-time is constant and independent of the played interval
- **I-ći** – the glide-time depends upon the played interval. The larger the interval, the longer the glide-time.

**Glide mode** (center display dot lit)
- **Std** – the glide-effect is triggered with every played note
- **LEG** – the glide-effect is only triggered with notes played legato.

**Glide curve** (right display dot lit)
The display is meant to visualize the glide-characteristic:
- first setting – logarithmic
- second setting – linear
- third setting – exponential

**Reset** – this function switches the LFOs' behavior.
Press **Enter** to select between **LFO1** (left display dot lit) and **LFO2** (center display dot lit).
- **ONE** – single cycle pass of the waveform (One Shot)
- **C0N** – cyclic repeating waveform repetition
CALIBRATING THE VCF
The key follow and resonance functions can be calibrated to match tonality. The values displayed are in hexadecimal. Due of the tolerances immanent to analogue systems, it is best to adjust this value using your ear.
Starting from the VCF menu, press Enter continuously, until the center display dot (key follow) or the right display dot is lit (resonance). Use Value to adjust the parameters.

DEMO-SEQUENCES
It is possible to use the sound engine of DOMINION X SED without an attached keyboard or sequencer. This is useful in case of a sound check or when creating new presets. There are four internal demo-sequences to work with.

DEMO – START/STOP
To start a demo-sequence, press and hold Enter in combination with one of the following four buttons: VCF Key, VCF Inverse, LFO1 Reset, LFO2 Reset. Each of the buttons will call up an individual sequence. Pressing Enter in combination with any of the three other buttons while the sequence is running, will start the new sequence from 1 immediately. Sequence 4 will just open the VCA and is meant to use the filter input without using the VCOs. Pressing Enter in combination with the active sequence's button while running, will stop the demo-sequence.

DEMO – SPEED AND TRANPOSITION
A demo-sequence's tempo can only be adjusting while the sequence is running. Press and hold Enter and use Value to adjust the tempo within a range of 60 and 120 (no BPM). The demo-sequences can be transposed using MIDI note data.
MIDI-DUMP
DOMINION X SED’s 128 presets can be sent out using the MIDI dump function for archiving purposes, e.g. in a DAW. Chose between the transmitting the full memory or any of the four presets banks A to D (page 15). From the MIDI menu, press Enter continuously until the right display dot is lit. Now, use Value to select between ALL, Ann, bnn, Cnn or dnn. Press Store to start the dump process.
To reload MIDI dump data into DOMINION X SED, simply play back the dump file. DOMINION X SED will automatically switch to receive the data.

PROGRAM CHANGES
DOMINION X SED sends and receives MIDI program change commands, except when set to Pot. Whenever a preset in DOMINION X SED is selected and loaded by pressing Enter, the corresponding program change command is send to the MIDI output. This happens in regard to the internal preset banks. Presets A01 to A32 correspond to the identical program change number. Preset b01 equals program change 033, preset c01 equals program change 065 and so on.
Program change commands received by DOMINION X SED will automatically call up the corresponding preset. Unlike a manual load of a preset, there is no need to press Enter.

SYSEX-ID
Set DOMINION X SED’s SYSEX-ID from the MIDI menu. Press Enter continuously until the center display dot is lit. Now, use Value to adjust the ID.
CONNECTIONS

REAR-PANEL
Power – plug the included 12 volts power supply in here
Note: Pressing ON/OFF does not switch the power supply of. This switch simply interrupts the power connection to DOMINION X SED.

MIDI IN / MIDI OUT / MIDI THRU – use these three jacks to connect your MIDI-peripherals.

INSERT – this TRS-jacks allows insertion of an effects-unit in DOMINION X SED's signal path, using a Y-cable.

AUDIO OUT – this jack carries the monophonic output signal

TOP-PANEL
The top-panel-connections allow controlling DOMINION X SED by using analogue CV- and gate voltages. Adequate control units are step-sequencers like MFB's URZWERG PRO or MEGAZWERG for functional expansion. In addition, DOMINION X SED is also compatible to all common Euro rack module synthesizer systems.

CV VCO1 / CV VCO2 / CV VCO3 – these inputs allow control over all three VCOs using CV-voltages conforming to the 1V/oct. standard. With only one input connected, the signal will be distributed to the following VCOs. By this, connecting a single CV to input VCO1 allows control over all three oscillators' pitches simultaneously.

GATE – apply a 5 volts gate-signal here to trigger both envelopes. With the Reset and/or the one-shot-function being active for one or both LFOs, this signal will also trigger these functions.
**FM VCO** – an external signal applied to this input will replace VCO3 as the source of frequency modulation. The settings for Select and Freq Mod will remain valid. Inserting a cable here will interrupt the internal FM-connection.

**SYNC** – an external signal applied to this input will replace VCO1 as the sync-source. The setting for the Sync selector will remain valid. Inserting a cable here will interrupt the internal sync-connection.

**MIXER** – this input allows feeding an external audio signal into the signal path, replacing the noise generator in the mixer stage. Use Noise/Ext to adjust the external signal's level. Inserting a cable here will disable the internal noise generator.

**CV VCF** – this CV-input allows modulation of the filter frequency with a voltage ranging from 0 to 5 volts. This modulation is added to the existing modulation signals of the envelope and LFO.

**CV VCA** – this CV-input addresses the VCA, using a range of 0 to 5 volts.