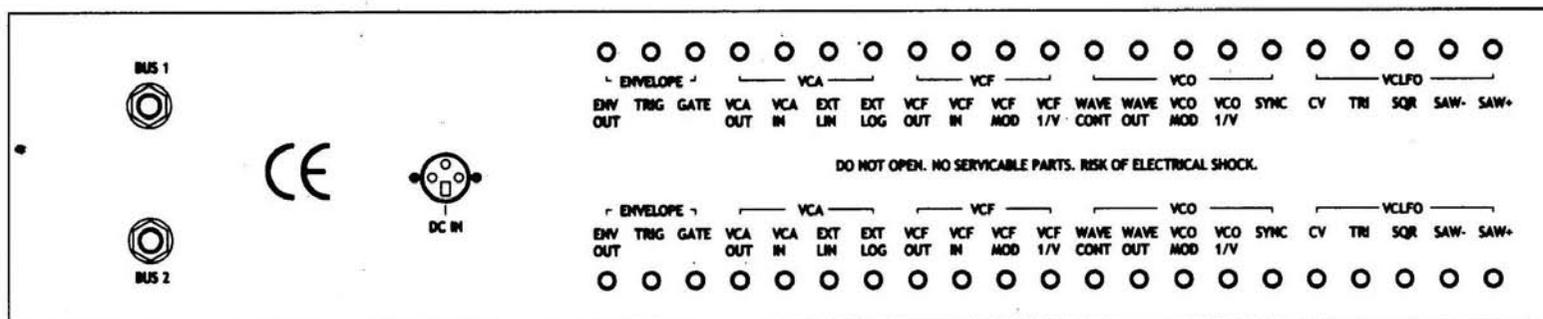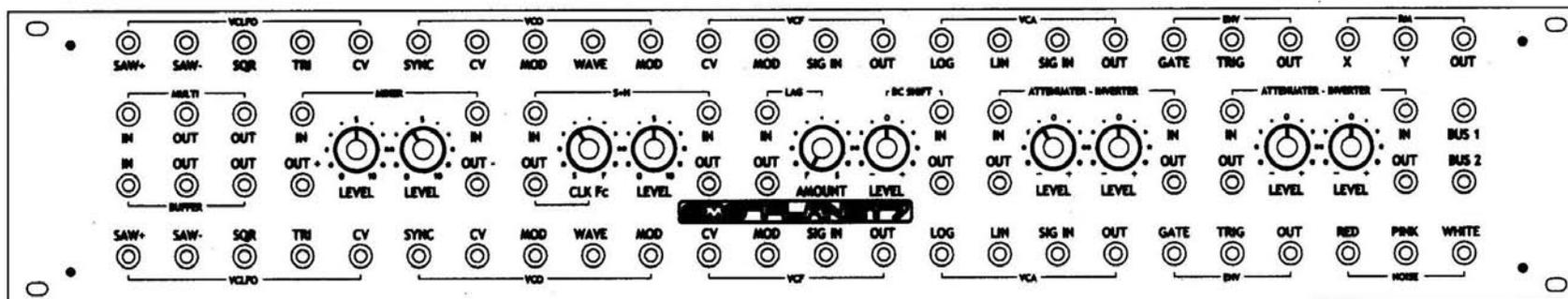# SYNTHETIC MUSIC SYSTEMS
## HAND MADE ANALOGUE SYNTHESIZERS
# PLANET 7 OPERATORS MANUAL

# CONTENTS

# INTRODUCTION TO SYNTHETIC MUSIC SYSTEMS

Greetings fellow noise makers. If your reading this you've probably just taken delivery of a superb piece of analogue music making equipment we call the MARS and PLANET7 system.

SMS is a small friendly company hand building analogue music synthesizers. We're driven by a passion for electronic music and the classic analogue sound.

Our objective at SMS is to keep all aspects of our business on a very personal level. We take a great deal of care and pride in every instrument we build and would like each and every one to lead a long and healthy life, so if we can help you in anyway please get in touch.

# INTRODUCTION TO THE P7

The P7 has been specifically designed to sit between two SMS MARS Synthesizers. Bringing the sockets on the rear of the MARS to the front of the P7 for convenient patching. Along with the additional modules in the P7, complex patching and sound synthesis is possible. The following pages in this manual will explain what the P7 modules are and how they can be used in conjunction with the MARS synthesizer.

But remember the key to getting the best results from your new shiny blue fellas is to experiment. This is the point of a modular synthesizer, in pre patched synthesizers you have little or no control over audio and modulation paths but when you control what goes where there are no limitations, audio signals can become modulation sources, VCA's can be used to add voltage control over resonance on a VCF and Ring Modulators can create complex and shimmering wave forms to enhance a standard patch.

SMS is committed to the P7/MARS system and a range of modules are under development to compliment and enhance the system possibilities. All have open ended architecture allowing for direct interfacing.

*So get patching and happy synthesizing.*

***THE SMS TEAM.***

# CONNECTING YOUR P7 TO MARS

Before you start connecting your MARS to the P7 make sure the MARS is disconnected from the mains (240 or 110 AC). The P7 has no internal power supply so it is powered from one of the MARS synthesizers, usually the top unit. With the supplied 3 pin DC lead connect the MARS and P7 using the large round 3 way socket on the back of the MARS and P7, make sure this lead is fully inserted and locked into position. Next using 21 of the 42 150mm supplier jack leads connect the 21 3.5mm jack sockets on the rear of the bottom MARS to the row of 21 3.5mm jack sockets running along the bottom of the P7, when this is complete use the remaining 21 leads to connect the top row of P7 jack sockets to the top MARS. All P7/MARS interconnecting is now complete. To the left of these sockets are two 1/4 inch jack sockets, these are 2 bus sockets connected to the front 3.5mm bus sockets. They are usually used for audio out connections to a mixer or effects unit but can of course be used for any type of patching.
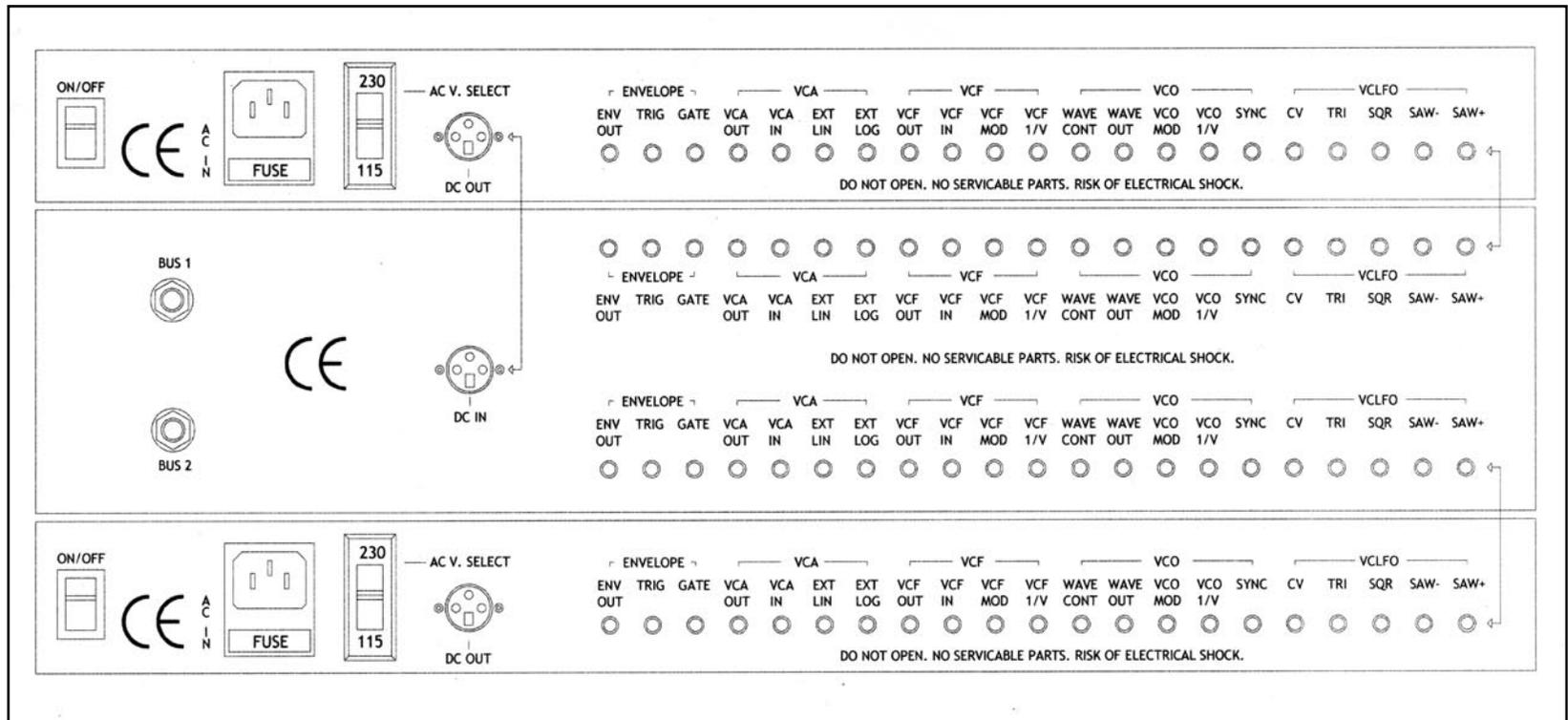
## MULTI
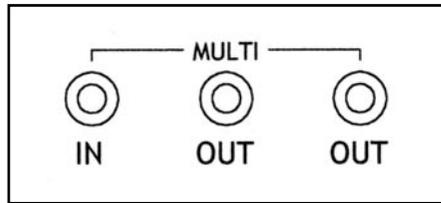
The three multi sockets are used when two or three patch points need to be connected, e.g. this can be used when one gate signal is available patched to the 'IN' socket and the two 'OUT' sockets are patched to the two gate sockets of the envelope shapers on each MARS. These sockets are not recommended for direct linking of 2/3 different DC voltages as this is not a voltage mixer.

## BUFFER
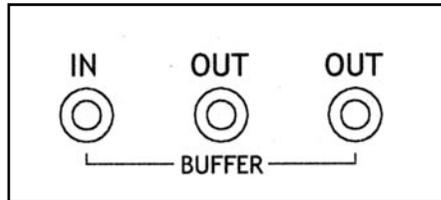
The three sockets associated with the buffer are used when one control voltage is used to control two C/V inputs e.g. this could be used when a single control voltage is available but you need to drive two VCO's. The circuitry of the buffer maintains the voltage of the 'IN' socket and does not allow the voltage to droop at the two 'OUT' sockets, always use the 'IN' socket for the input voltage. If there is no voltage present at the 'IN' socket the output voltage will be approx - 10V.

## MIXER
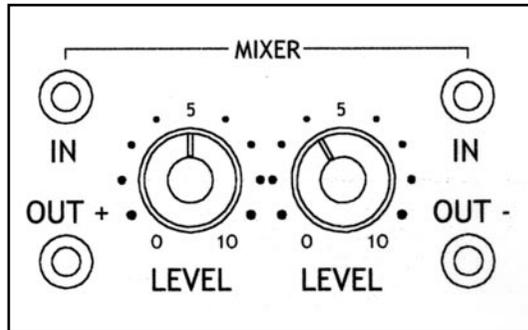
The mixer on the P7 is used to 'Mix' two signal or control voltages, each 'IN' socket has an associated level pot to allow signal attenuation, two outputs are available. The '+OUT' is a non inverted output of the two mixed input signals, the '-OUT' is 180° out of phase with the '+OUT', and is still governed by the mixer level pots

## SAMPLE & HOLD
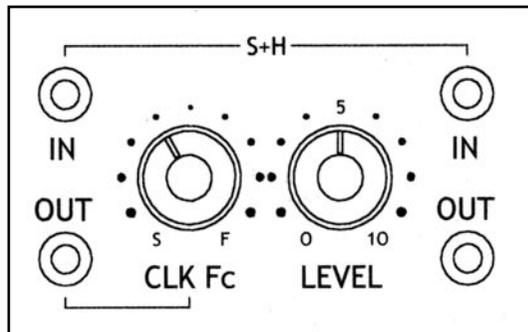
The sample and hold circuit can be used to create patterned or random control voltages, usually used to control the pitch of a VCO, cut off FC of a VCF or amplitude of a VCA. The S&H of the P7 has a built in pulse generating Oscillator and the frequency of this Oscillator is controlled by the CLK Fc pot. There is no internal connection to the S&H so if the internal Clock is to be used a jack lead must be connected between the 'OUT' socket and the Clock 'IN' socket above, if an external Clock is used this lead must be omitted and the Clock to control the S&H placed directly in the 'IN' socket. Narrow pulse with 0/+10V will clock the S&H, it is these pulses which create the Clocked/rate of the S&H Output voltages. The waveform to be 'Sampled' enters the S&H via the 'IN' socket, any source can be used but as an example low frequency noise (red noise) will give a good random effect, this can also be achieved with a Sawtooth wave from the LFO running at approx 20Hz. If however the Fc of the Sawtooth is suitably slow the effect becomes more patterned and descending or ascending voltages pulse will be generated. The Output voltage level/range can be adjusted using the Output level pot.

## LAG
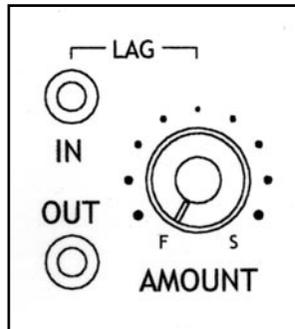
The LAG processor is a method of slewing voltages, if a C/V from a keyboard is connected to the 'IN' socket of the LAG and the 'OUT' connected to the 1V/Oct input of an Oscillator 'Portamento' may be introduced, as the control knob is rotated clockwise more 'LAG' is introduced and the voltage will take longer to glide between notes, LAG is often used after a S&H to smooth the steps between the S&H output voltages. An often overlooked use of the LAG processor is as a basic fixed Fc filter, although there is no CV of the frequency it can be used to attenuate frequencies not required, the high hiss of white noise or to smooth a square wave into a triangle.

## DC LEVEL SHIFTER
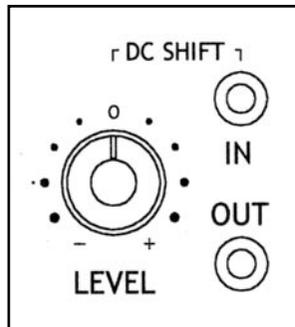
The DC level shifter can be used in 2 ways, its main use is to 'Shift' a voltage or waveform within a +/- 10V range e.g. the MARS VCLFO produces wave forms of +/-5V, this means if an un-attenuated signal is fed into the 1V/Oct input of a VCO the pitch of the Oscillator will be modulated 5 octaves above the initial frequency and 5 octaves below. If however you connect the +/-5V into the Shifter via the 'IN' socket the waveform can be offset with respect to the 'OUT' socket. With the control knob in the 'O' position no shifting occurs, turning the control pot clockwise will effectively shift the +/-5V wave to a 0/+10 voltage and turning the pot anti clockwise to a 0/-10 wave. The control pot does not attenuate voltages, only shifts them so be aware of clipping. Combining this module and the Atten/Inver module (described next) can take any waveform and change not only its DC level but also its level and polarity.

The second use of the DC level shifter is as a fixed voltage generator. When the 'IN' socket of the shifter is not used a voltage of +/- of 10V can be generated at the 'OUT' socket. With the control pot in the 'O' position no voltage is present at the 'OUT' socket but as the knob is turned clockwise an increasing positive voltage will be generated, turning the knob anti clockwise from the 'O' position will generate an increasing negative voltage.

## ATTENUATER/INVERTER
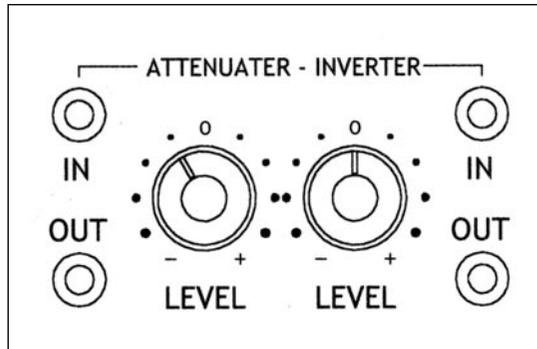
The P7 is equipped with 4 Attenuater/Inverter modules, their use is attenuate or invert control voltages and audio signals e.g. the MARS Envelope produces a control voltage of between 0 and 10v over time governed by the Envelope settings, if you were to connect the output of the Envelope to the 1V/Oct input of a VCO the pitch of the Oscillator would increase by 10 octaves above the initial frequency - you are more likely to require a more subtle change in the VCO pitch and using one of the    modules gives you this control. Connect the  Voltage/Signal to the 'IN' socket of the Attenuater/Inverter module, with the control pot in the 'O' position there is no voltage or signal at the 'OUT' socket, as the control knob is turned clockwise more input signal is available at the 'OUT' socket. This is a unity gain device and not an amplifier so you can only get out what you put in. If you now turn the control knob anti clockwise from the 'O' position the signal at the 'OUT' socket again begins to increase but this time the voltage is inverted, if it is an audio signal you will not be able to tell the difference if you are monitoring the output with an amplifier and speakers but when used as a control voltage or in a feedback path inverted signals are essential.    If as previously discussed you are using an Envelope to control the pitch of a VCO turning the control pot from 'O' clockwise will allow how much the Envelope controls the pitch positively, turning the knob from the 'O' position  anti clockwise will control the amount of pitch control but this time the pitch will decrease.

# RING MOD
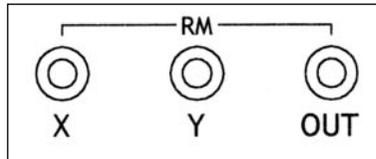
The P7 is equipped with a high quality Ring Modulator or RM for short. The RM has two inputs designated 'X' and 'Y' and an output. The RM in the P7 is AC coupled and can be used two ways, 1) connecting an audio signal to the 'X' input or 'Carrier' input from one source and an audio signal to the 'Y' input or 'Signal input' from another, the frequencies of the sum and difference of the two signals are generated. Very complex waveforms are generated and available at the 'OUT' socket. Ring Mods are often used to create bell or gong sounds and a wide range of frequencies and waveshaper will produce beautifully harmonic sounds or just weird and freaky non related harmonics. Sweeping the waveshape and or pitch of a MARS Oscillators will introduce dynamic changes. You must have a signal in the 'X' and 'Y' inputs or there will be no output.

The second use for the P7 RM is frequency doubling. If a sinewave is applied to both the 'X' and 'Y' inputs the output is twice the frequency of the input.

# NOISE GENERATOR
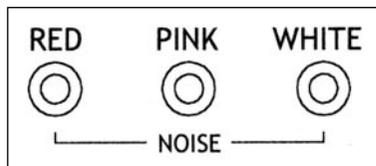
The P7 is equipped with a 3 'Colour' Noise generator producing White, Pink and Red (or low frequency noise). Noise can be used as both an audio and control source. White noise is the most common type of noise generator found on synthesizers and is defined as having a mixture of all frequencies and having equal energy - very hissy in character. Pink noise is generated by filtering White noise producing noise with equal energy per octave. Red noise is generated by filtering again, producing only the very low frequencies and has a very distinct low rumble.
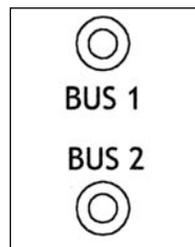
# BUS

The two Bus sockets are directly connected to the two quarter inch sockets on the rear of the P7. They are a means of taking the outputs from MARS/P7 system to other devices or patch bays allowing easy connection when the P7/MARS is installed in a rack.

| | |
|---|---|
| **Burn-In** | Before final calibration units are burnt-in for a minimum of 96 hours. |
| **Power Requirements** | UK: 230v AC  50 Hz (220v - 240v). <br> Export: 115v AC  60Hz (100v - 120v). |
| **Internal Supply** | +/- 12v DC  90 mA. |
| **AC Voltage Select** | The MARS has an 'AC V. SELECT' switch. It is imperative that this is set correctly. <br> Failure to do so will void warranty and damage the unit beyond repair. <br> Ensure mains power is disconnected before connecting the MARS synthesizer to the <br><br> PLANET7 Expander. |
| **Warranty** | The SMS P7 comes with a 12 month (from purchase date) back-to-base warranty, <br> (i.e. customer must arrange and pay for carriage to and from SMS). |
| **Contact Us** | Please don't hesitate to get in touch with us for any enquiry: <br> Andy Pledger: andy@syntheticmusicsytems.co.uk <br> Tel. (44) 01767 681369 <br> www.syntheticmusicsystems.co.uk |
| **Thanks To** | Paula Allen (Web and Manual Design) <br> Ian at Action Hardware <br> Richard at One Way Circuits <br> Steve "synth-genius" |
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# SMS MARS & PLANET7 BLANK PATCH SHEET