Spider
Wasp Deluxe
Wasp

ELECTRONIC DREAM PLANT

(OXFORD) Limited

WASP SYNTHESISER - OWNER'S MANUAL

INTRODUCTION

The WASP.

The WASP has been developed as a low-cost high-performance electronic music synthesiser. The design of the instrument has been kept as simple as possible. However every single control on the front panel has a part to play in creating the unique sound of the WASP.

To many people the controls will be familiar. Similar types are found on nearly all synthesisers. However those who have never played a synthesiser may find all the names a little confusing at first. For that reason this manual has been devised to explain all the terms and control functions that are common to these instruments.

About the Manual.

The best way to understand all the facets of the WASP is to sit down with the instrument and this manual and to work through the various sections step by step. In this way the effect of each control will become clear. Those who have some previous knowledge of synthesisers may find the manual over-simplified, but working through it step by step is still recommended because the WASP has several unique features not to be found on other instruments.

SECTION I. SETTING UP the WASP.

The WASP, unlike an electric guitar, requires electric power to operate all its circuitry. This power can be supplied by either:

(a) Batteries. By removing the six screws on the underside of the instrument and lifting the battery compartment cover, six HP11 batteries can be fitted. It is important to align the batteries as indicated. The cover and screws can then be replaced and the WASP is ready to use. In the case of the WASP DELUXE, insert the batteries three at each side of the instrument.

(b) 9V d.c. Adaptor. This is simply a transformer that converts the 240 volt mains into a 9 volt d.c. supply which can be plugged into the small socket on the top panel. This is labelled "29" in Figure 1. The adaptor should be rated for a current of 125 mA or more. If in doubt contact your dealer for advice. The Adaptor we recommend is the "Robert PS9 Battery Eliminator" since this has a stabilised output and does not cause a hum when used on the internal speaker.

The WASP is switched off when the output volume control (labelled "25" in Figure 1) is turned fully anti-clockwise (a click should be heard). Therefore after fitting either the batteries or the d.c. adaptor, turn this control clockwise, set all the knobs to the positions shown in Figure 1 and touch the keyboard. A sound should be heard from the built-in monitor speaker (31).

Using an External Amplifier.

If, at this stage, you wish to plug the WASP into an external amplifier, a jack lead should be linked from the LINE OUT socket (27) to the amplifier input. As a result the internal speaker will be automatically disconnected.

It is advisable to operate the WASP with the volume control on full and to set the correct level of volume using the amplifier controls only. This will minimise any background noises.

Touch Sensitive Keyboard (WASP only).

It is very important to set up the sensitivity of the keyboard to your own requirements. Even though the keyboard may be set correctly for one person, this does not mean that it will suit you since finger conductivity varies from one person to another.

To set the sensitivity use a small screwdriver and adjust the screw located above top "C" on the keyboard. Turn until the "feel" is right but not so that the keyboard sounds when there is no finger on it.

SECTION II. The OSCILLATORS.

With the controls set as shown in Figure 1, only Oscillator 1 (controls (4), (6) and (8)) should be heard.

An oscillator can be considered to be any medium that is vibrating. A ruler that is twanged over the edge of a desk, or a string on a guitar when plucked, are both examples of oscillators. In the case of the WASP the medium involved is electricity. The oscillator is the basic building block of all synthesisers.

In the WASP there are two separate oscillators.. The pitch of the Oscillator (its rate of vibration) is determined by several factors:

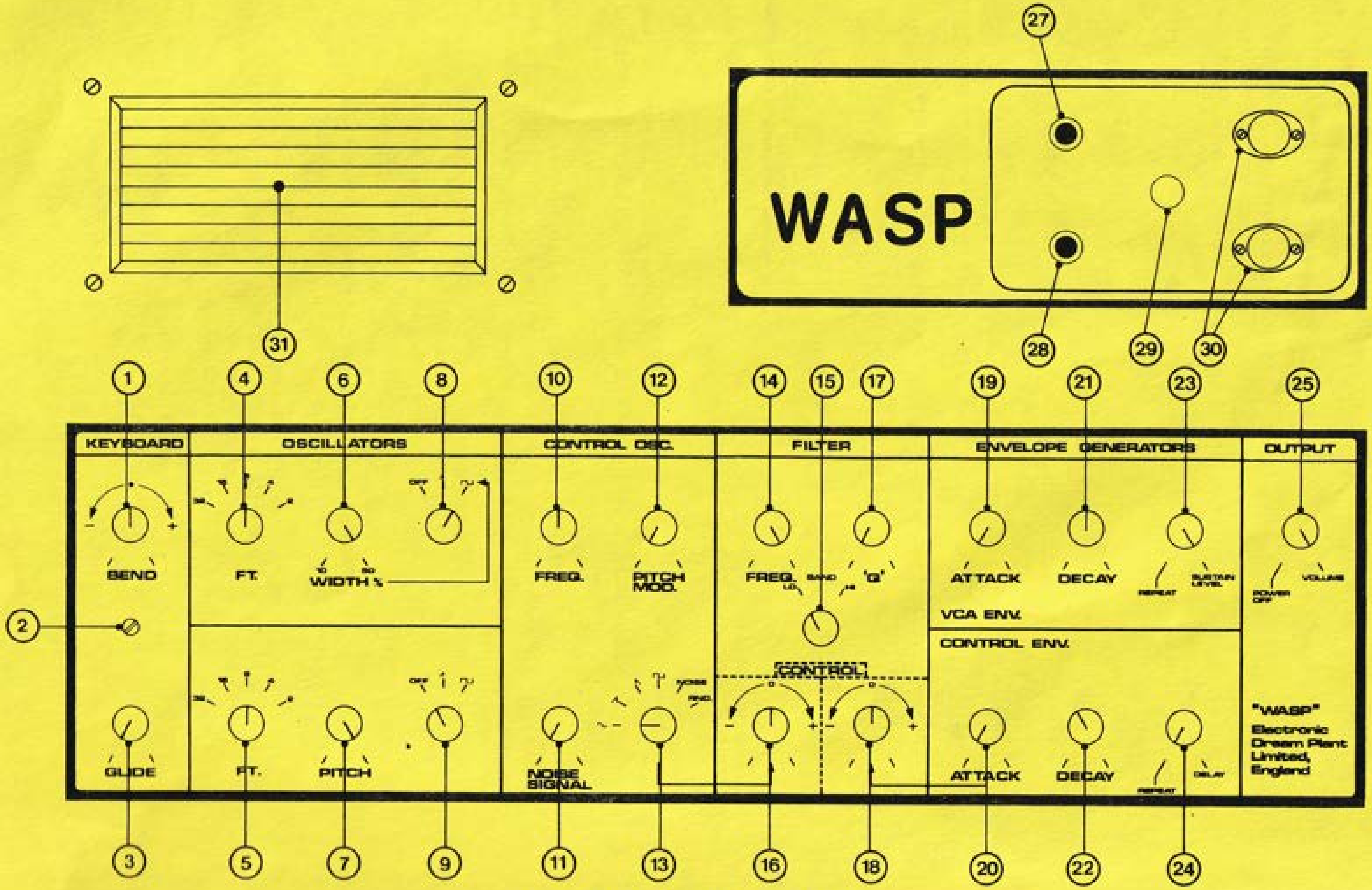


Fig. 1 CONTROL IDENTIFICATION

(1) The keyboard, which controls the oscillator over a two-octave range (C to C).

(2) The footage (FT) control (labelled 4) which steps the oscillator over five octaves. To see its effect, hold down middle C and turn the FT control down to 32, up to 2 and then back to 8. The numbers 2, 4, 8, 16 and 32 correspond to lengths of organ pipes; when the length of a pipe is halved the pitch of the note it makes is raised by an octave.

(3) The BEND control (1). Turn it to the right and the pitch increases; to the left the pitch decreases.

(4) The PITCH MODULATION control (12), which is dealt with in Section VI.

(5) The TUNE preset control (2); see Section V.

All these parameters affect the pitch of Oscillator 1. In addition to having variable pitch, the actual way in which the oscillator vibrates, known as the waveshape or waveform, can be modified.

The three-position WAVESHAPE selector (8) is used to switch the oscillator off or to give sawtooth or rectangular waveshapes. These waveshapes are shown in Figure 2.

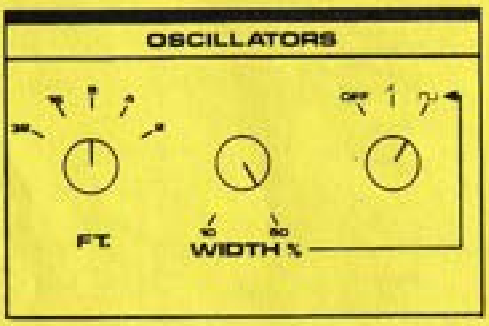


Fig. 2 **OSCILLATOR POSITIONS**

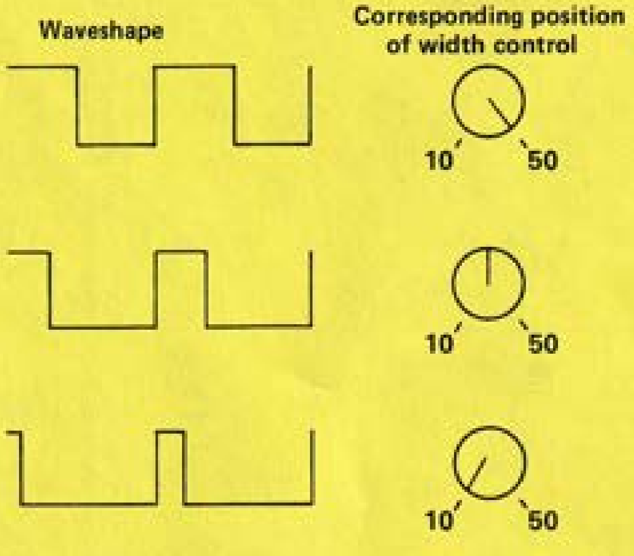


Fig. 3

In the case of the WASP DELUXE there is also an EXTernal setting. This now allows you to plug an external instrument into the back of the synthesiser and to change the sound of the instrument with the Filter section and the Control Oscillator. When using the EXT position the keyboard must still be triggered by holding down a note.

There are also separate volume controls on the WASP DELUXE for each oscillator.

ACTION: switch between the sawtooth and rectangular positions and listen to the difference in tonal quality between the two waveforms. The sawtooth wave has a reedy sound while the rectangular wave has a hollow quality to it. In addition, the rectangular wave can be modified using the WIDTH control (6).

ACTION: select the rectangular wave (8) and then turn down the width control. This has the effect of decreasing the positive period of the vibration cycle whilst increasing the period of the negative part (see Figure 3).

As you turn down the WIDTH control the tone of Oscillator 1 will become thinner with more complex harmonics.

Oscillator 2 (controls (5), (7) and (9)) is slightly different in that instead of a width control, a PITCH control (7) has been included. This allows the interval between the two oscillators to be adjusted. This could be any interval at all - a third, a fifth, a seventh etc. Greater intervals can be obtained by changing the FT control (5).

ACTION: switch in Oscillator 2 and set up the oscillators as shown in Figure 4. Turn the PITCH control so that the two oscillators are in tune when a note is played. Note that tolerance differences from machine to machine mean that to get the oscillators perfectly in tune the position of the PITCH control could lie anywhere in the shaded area.

ACTION: rotate the PITCH control and note that Oscillator 2 can go up about 3 or 4 semitones or down nearly an octave. Therefore any required interval between the oscillators can be obtained.

If for example an interval of a fifth is required between the oscillators, two alternatives are available:

(a) set Oscillator 2 down a fifth.
(b) raise Oscillator 2 by a fifth.

Working from a unison setting (e.g. Figure 4) makes choice (a) the easiest to set up but this will leave the instrument as a whole a fourth below standard tuning. It is therefore normally necessary to make Oscillator 1 the fundamental pitch and to set Oscillator 2 to the required interval above the fundamental.

In the case of the above example, however, since the PITCH control cannot turn up a complete fifth, it is necessary to turn the FT control (5) up an octave on Oscillator 2 and to turn the PITCH control down a fourth, leaving a PITCH setting similar to that shown in Figure 5.

The PITCH control also enables the two oscillators to be very slightly detuned against one another.

ACTION: set up the oscillators as in Figure 4 and fractionally increase the setting of the PITCH control. This gives a rich phasing effect very characteristic of the synthesiser.

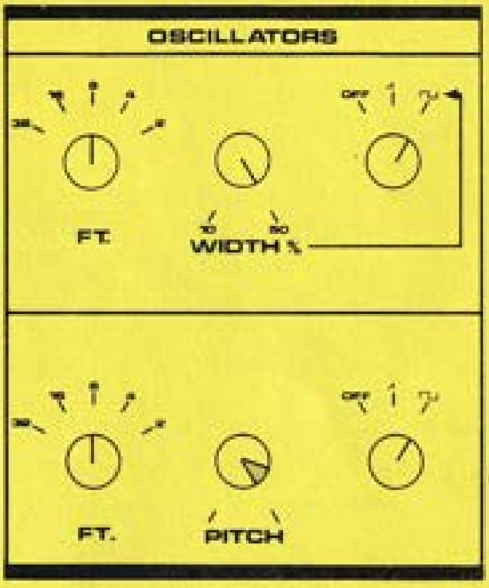


Fig. 4

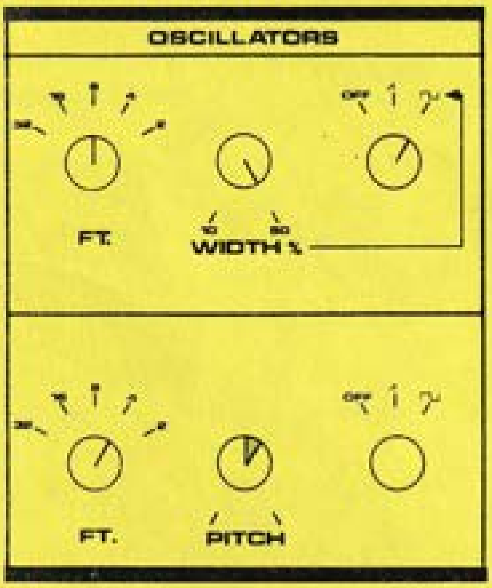


Fig. 5

SECTION III. The NOISE SIGNAL.

The noise is a digitally-generated random sound; it doesn't have a fixed pitch like an oscillator but consists of random frequencies that cover the audio spectrum (the range of pitches which the ear can detect).

ACTION: switch off both oscillators using controls (8) and (9) and turn up the noise signal, control (11). The characteristic hissing can be heard. On its own this does not sound very exciting but it is particularly useful especially for percussive sounds and sound effects.

SECTION IV. The KEYBOARD CONTROLS.

1. BEND.

The BEND control (1) is normally set at the mid position. When a note is played, by rotating this control clockwise the pitch of both oscillators (and the filter) is raised by over a semitone. Rotate it anticlockwise to lower the pitches by the same amount.

This control has a centre dead spot which means that there is little control over that region. This is so that the knob does not have to be returned to exactly the central position every time it is used.

2. TUNE.

Beneath the BEND knob is a hole through which a preset tuning control can be seen. This is used to tune the WASP to a specific pitch (e.g. to A440 or to another fixed pitch such as an organ).

To tune the WASP to the desired pitch switch off Oscillator 2 and make sure that the BEND control is centralised. Insert a small flat-bladed screwdriver through the hole (2). Also refer to Figure 6. The preset control is similar to the head of an ordinary screw and by turning it the WASP can be tuned to any desired pitch.

3. GLIDE.

This control (often known as PORTAMENTO) is used to increase the time taken for the WASP to change from one note to another. When used with both oscillators turned on an interesting effect is achieved as the tuning of the two oscillators is offset during the period of the glide.

ACTION: hold bottom C and tune Oscillator 2 in unison with Oscillator 1, on the 8-foot range. Play top C and then low C with varying amounts of glide.

Fig. 6

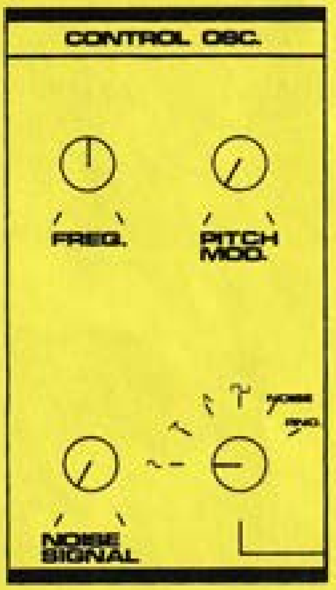


Fig. 7

SECTION V. The CONTROL OSCILLATOR.

This is a low frequency oscillator which does not produce any sound as such but is used to control the two oscillators already mentioned, and the filter. The control knobs concerned are (10), (12) and (13) in Figure 1 and are also set out in Figure 7.

The Control Oscillator can produce six different waveshapes selected by the rotary switch (13). Reading clockwise these are: sinewave, rising sawtooth, falling sawtooth, square wave, noise and random.

ACTION:

(1) set the controls as in Figure 1.
(2) set the Control Oscillator FREQuency (10) and PITCH MOD (12) controls to the mid position (12 o'clock).
(3) hold any note. The pitch of Oscillator 1 will smoothly rise and fall as represented by the shape of the sine wave.
(4) while still holding a note try the effects of the other modulation waveforms (knob 13). The speed of modulation is increased by advancing the FREQ control (10) while the amount of modulation is determined by the PITCH MOD control (12).
(5) experiment with different combinations of controls (10), (12) and (13).
(6) the GLIDE control will affect the shape of the modulating waveform. As an example, set the controls as in Step (2) but with the waveshape (13) on squarewave. Increase the glide whilst holding a note. Note how the edges of the squarewave become "rounded" by the glide.

The Control Oscillator can be used on both audio oscillators.

SECTION VI. The FILTER.

The two oscillators and the noise signal are all fed into the filter, which can be considered to be a complex type of tone control. There are three types of filtering available:

(a) Low Pass: This lets through all parts of a signal below a certain frequency.

(b) Band Pass: This allows a certain band of frequencies through.

(c) High Pass: This allows through all parts of a signal above a set frequency.

It should be noted that there is not a sudden cutoff above, at or below the set frequency, but a gradual decrease in volume of pitches moving away from the set frequency. This may become clearer by reference to Figure 8.

The set frequency about which the filter operates is controlled by the FREQ knob (14). This and other controls associated with the filter are shown in Figure 9.

ACTION:

(1) Set controls as in Figure 1.
(2) Turn off Oscillators 1 and 2 (8, 9).
(3) Turn the Noise signal up full (11).
(4) Hold low C whilst fully rotating the FREQ control (14).
(5) Repeat (4) with the filter in the bandpass and highpass positions (control 15).

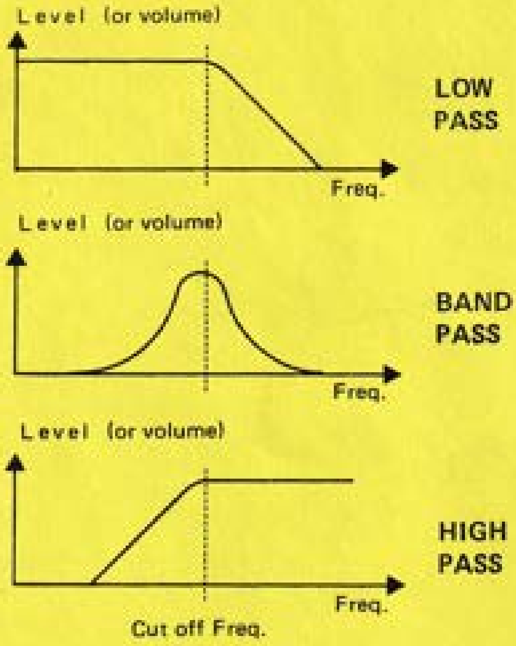


Fig. 8

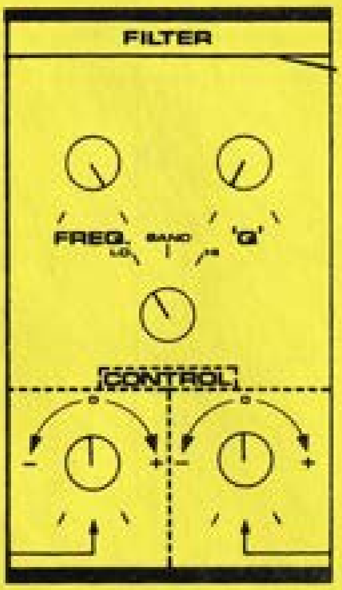


Fig. 9

As the noise signal can be considered to be made up of frequencies covering the whole audio spectrum, this should give a clear idea of the effect of the filter in various modes.

The knob labelled "Q" (control 17, sometimes called RESONANCE on other instruments) causes the filter to emphasise any signal that is close to the cutoff frequency.

ACTION: repeat (4) above with the Q control fully clockwise. This will sharpen the sound.

In addition to modulating the frequencies of Oscillators 1 and 2 the Control Oscillator can be used to sweep the Filter frequency. The amount of modulation is determined by knob 16. Refer to Figure 10. If this knob is set in the mid position it has no effect. Rotating it clockwise will increase the amount of modulation, the shape and speed being determined by controls (10) and (13). Rotating it anticlockwise gives a similar effect but the modulation waveshape is inverted.

ACTION:

(1) Set up the Control Oscillator as shown in Figure 10, with Oscillators 1 and 2 in unison on 8-foot.

(2) Hold middle C and rotate the control (16) clockwise and then anticlockwise. When it is clockwise (positive modulation) the filter will be swept by a rising sawtooth as shown. Turning it anticlockwise alters the sweep waveshape to a falling sawtooth. Figure 11 makes these clearer. Note that for full modulation the FREQ control (14) has to be set so that the Control Oscillator can cover the full frequency range of the filter.

(3) With the modulation (16) set fully positive, vary the FREQ control over its entire range. It can be heard that there are limits at the extremities of the range.

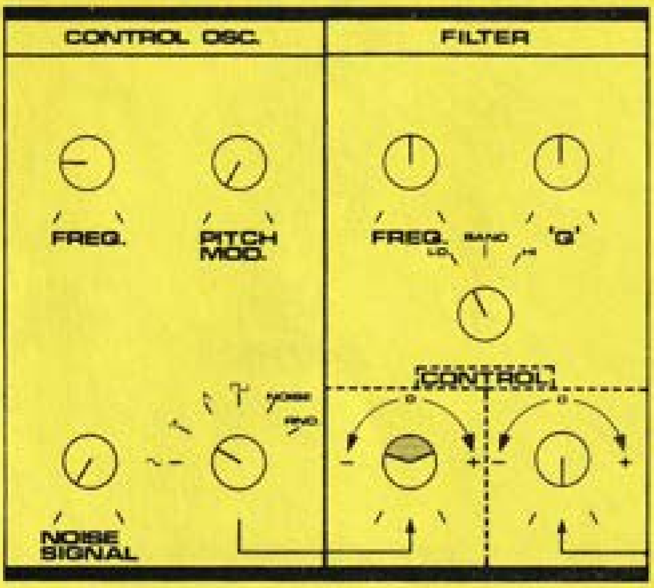


Fig. 10

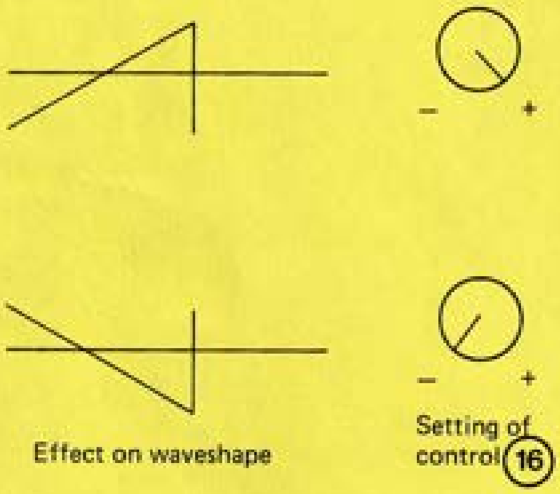


Fig. 11

Control (18), which is explained fully in Section VIII, also introduces modulation of the filter, but from the Envelope Generators. This is the reason why controls (16) and (18) are placed together on the front panel.

In addition the Filter cutoff frequency, like the frequencies of Oscillators 1 and 2, is also determined by the note played on the keyboard.

ACTION: (1) Set the WASP up as shown in Figure 10, but with the oscillators off and the noise source on full.

(2) Play the keyboard from low C up to top C. The Filter will be heard to track the keyboard. This is useful when using Oscillators 1 and 2 since it means that the way the Filter modifies the waveshape of the signal will not change over the range of the keyboard.

SECTION VII. The ENVELOPE GENERATORS.

The WASP has two Envelope Generators:

-- The VCA (Voltage-Controlled Amplifier) envelope is used to shape the output amplitude of the WASP and involves controls (19), (21) and (23).

-- The Control Envelope is used to sweep the filter; it involves controls (18), (20), (22) and (24).

Refer to Figure 12 for the positions of these controls.

VCA Envelope Generator.

This is of the attack-decay-release-sustain type. Figure 13 shows exactly what is happening with the VCA envelope. When a note is played the envelope is triggered and the volume of the output from the WASP increases at a rate determined by the ATTACK control (19). It reaches a peak then decays to a level determined by the SUSTAIN LEVEL control (23), decaying at a rate set by the DECAY release control (21).

The output/ volume will remain unchanged until the note is released, after which the volume will decay to zero at a rate set by the DECAY control.

ACTION: Set up the controls as in Figure 1 and experiment with the ATTACK, DECAY and SUSTAIN LEVEL controls. If the SUSTAIN control is turned fully anti-clockwise until it clicks, the Envelope Generator is put into a repeat mode. When a note is played and held this will cause the output volume to rise to a peak level, then decay to zero, and repeat this cycle until the note is released.

Control Envelope Generator.

This is fairly similar to the VCA Envelope Generator except that there is no sustain facility. Instead there is a DELAY capability whereby the envelope is triggered after the note is played. Figure 14 shows the waveform.

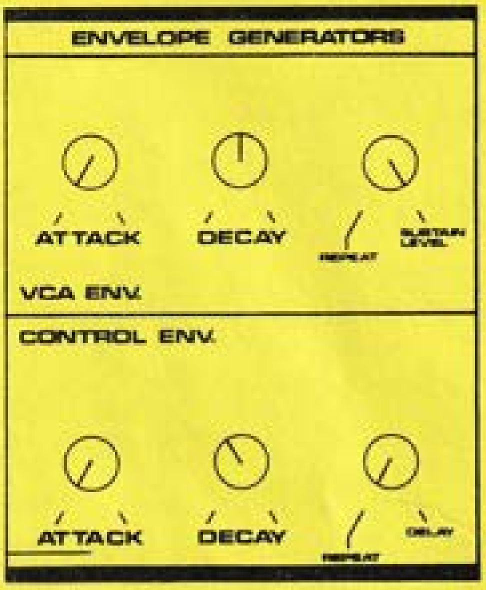


Fig. 12

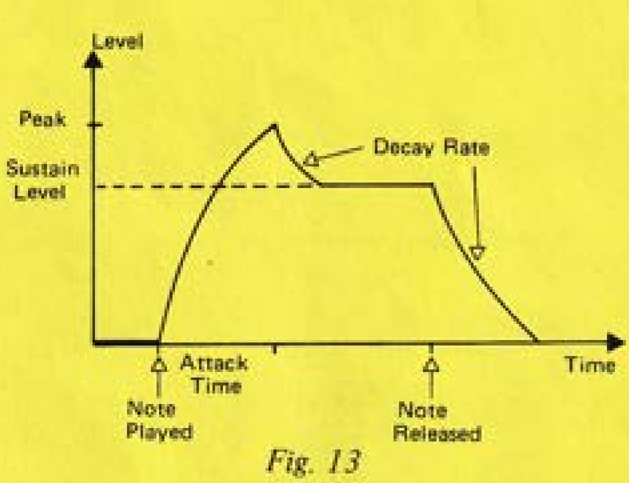


Fig. 13

The generator can be put into a repeat mode in a similar way to the VCA Envelope. The waveform it generates can be considered in a similar way to the waveforms of the Control Oscillator. Control (18) can be used to vary the amount of modulation and to invert the modulation waveform, just like control (16).

ACTION:

(1) Set up the WASP as in Figure 15 with the oscillators in unison and the noise at zero.
(2) Play the keyboard. The WASP should now be producing familiar synthesiser-like sounds.
(3) Experiment with the Filter FREQ control (14).
(4) Experiment with the Control Envelope ATTACK (20), DECAY (22), DELAY/REPEAT (24) and AMOUNT (18) controls.

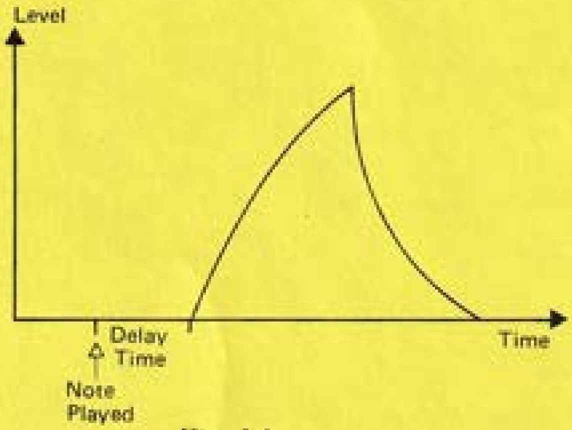
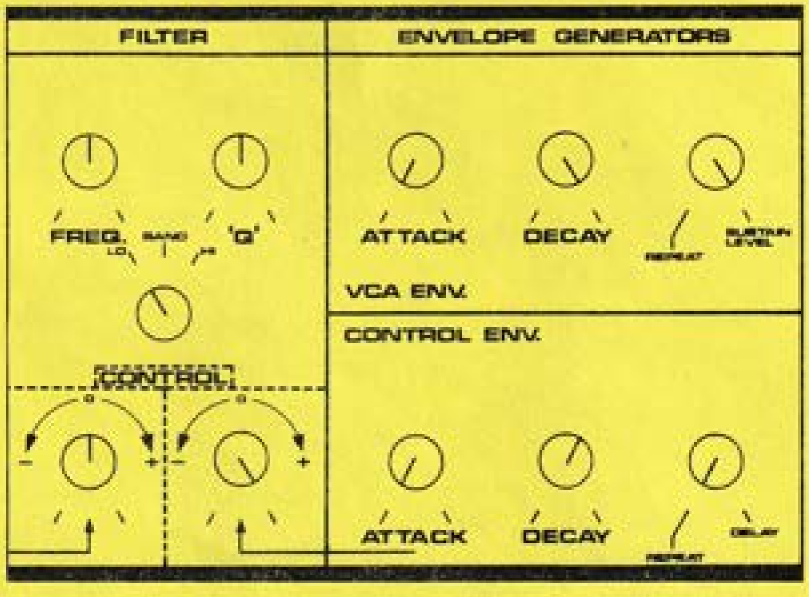


Fig. 14



SECTION VIII. OUTPUT and LINK SECTION.

The VOLUME control (25) and LINE OUTPUT socket (27) have already been dealt with in Section I.

Phones Socket (28).

This is a socket for stereo headphones, which also switches off the loudspeaker when in use. Note: the output will be in mono.

Link Sockets (30).

These 7-pin DIN sockets enable you to connect your synthesiser to the SPIDER sequencer, the CATERPILLAR polyphonic keyboard or to several other WASPS.

Note: NEVER use a 5-pin DIN plug as this could destroy some of the internal circuits. Also do not try to connect anything like a tape recorder as these sockets are designed specifically for digitally encoded information.

SECTION IX. TECHNICAL DATA.

Keyboard.

BEND: approximately one semitone up or down, with 90° centre dead band.

TUNE: approximately one tone up or down (preset to A = 440 Hz).

GLIDE: sweep adjustable up to 3 seconds over 2 octaves.

Oscillators.

OSC 1: choice of five octaves - 32' to 2'. Sawtooth output. Pulse output adjustable from 10% to 50% duty cycle.

OSC 2: as OSC 1 but with sawtooth or square waveform. The pitch is continuously variable over more than one octave, encompassing the pitch of OSC 1.

Control Oscillator.

Range approx. 1 Hz to 100 Hz.

Sinewave, rising or falling sawtooth and square waveforms. Also available for control are white noise, or noise sampled and held at Control Oscillator rate. Pitch of Oscillators 1 and 2 can be modulated by approx. one tone up or down using the Control Oscillator.

Noise.

Digitally generated pseudo-random noise which can be mixed in with the signals from Oscillators 1 and 2.

Filter.

Low-pass, bandpass (fixed bandwisth) or highpass. "Q" factor is adjustable from maximally flat to the verge of oscillation.

Automatic overload limiter.

12 dB per octave rolloff in high- or low-pass, 6 dB per octave in bandpass.

Turnover frequency is proportionally controlled by Control Oscillator (*), Control Envelope Generator (*) or by manual means. It is also proportionally controlled by the keyboard. Range is 3 to 16 kHz.

(* means continuously variable control from +Ve to -Ve).

Envelope Generators.

1. VCA Envelope Generator. Linear attack, rate variable from 3 mS to

2 seconds. Exponential decay, rate variable from 3 mS to 12 seconds. Decay is interrupted by a sustain period while the keyboard is being touched. The sustain signal level is adjustable. The repeat function causes continuous attack/decay cycles while the keyboard is being touched.

2. Control Envelope Generator. Triggered by VCA Envelope Generator via delay adjustable up to 1 second. Linear attack and decay with rates separately adjustable from 15 mS to 6 seconds. Repeat function causes continuous attack/decay cycles to occur.

Outputs.

Power on combined with volume control adjusts line output, headphones output and loudspeaker level. Nominal output at full volume is - 10 dBm into 600 ohm line, 0 dBm into 50 ohm speaker. Noise level at line output in quiet state is - 65 dBm.

Power Consumption.

Nominally 45 mA with speaker not in use, 150 mA at maximum volume with speaker connected.

Interface Lines.

There are seven tri-state lines operating at 5-volt CMOS logic levels; six keyboard code lines and one trigger line.

Patent Applied for 39335/78.

SPIDER DIGITAL SEQUENCER - OWNER'S MANUAL

SECTION I. INTRODUCTION.

What is a Sequencer?

A Sequencer is an electronic device which can store a series of pieces of data (information) and subsequently recall this data for further use. There are two types of Sequencer available; analogue and digital. Both these types enable the performer to set up a pattern of electronic information which is then used to control a certain parameter of the synthesiser.

The Sequencer can be considered as a spin-off, a by-product that has evolved out of the synthesiser. However it must be remembered that on its own a Sequencer is useless, in much the same way that a record deck is of no use without an amplifier and speakers.

Sequencers are generally used to construct melody patterns, bass lines and special effects etc., so they are usually set to control the pitch of the synthesiser's oscillators and to trigger its envelope generators. A Sequencer can be considered as an alternative controller to the keyboard; once information has been programmed into the Sequencer it will play the synthesiser on its own, without using the synthesiser's keyboard.

Consider Figure 1; the synthesiser controller must produce information that tells the oscillators what note to play, and also produces a trigger pulse that fires the envelope generators for every new note. A keyboard produces this information, but so can a Sequencer (when programmed). Therefore in Figure 1 the controller could be either a Sequencer or a keyboard.

Digital versus Analogue Sequencers.

Different types of Sequencers are programmed in different ways. An Analogue Sequencer has a row of knobs on the front of it, one set for each note, and to construct a sequence it is necessary to adjust each control in turn until you have the desired pitch and duration of note for each step.

Obviously the Analogue Sequencer will severely limit, by its physical size, the number of steps you can have in a sequence. Also constructing the sequence can take quite a long time.

Digital Sequencers, on the other hand, are far simpler to program and have a considerably larger capacity, so that they can store many more notes than can the Analogue machines. The Digital Sequencer makes use of technologically advanced electronics and is programmed directly from the keyboard of the synthesiser, thus saving time and effort.

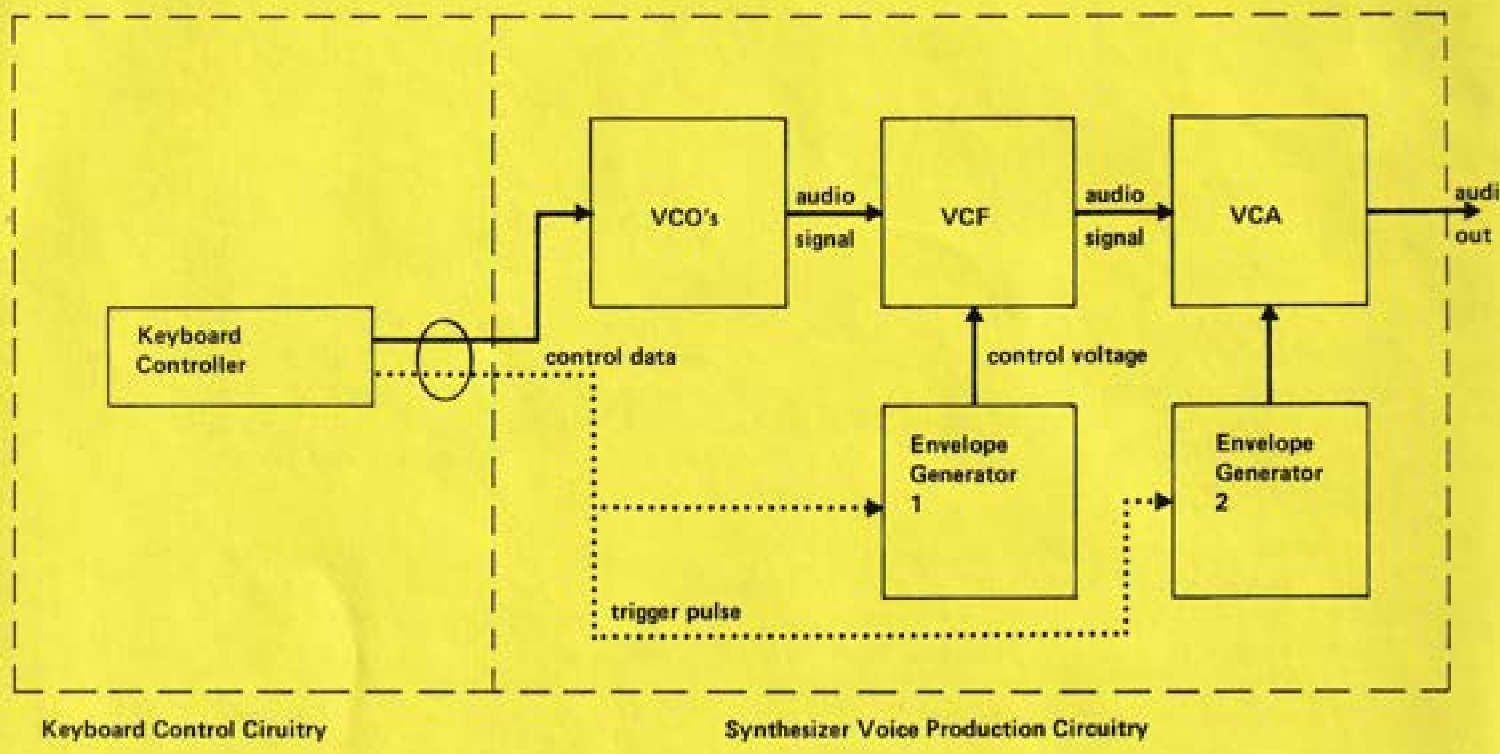


Fig. 1 A Standard Synthesizer Configuration

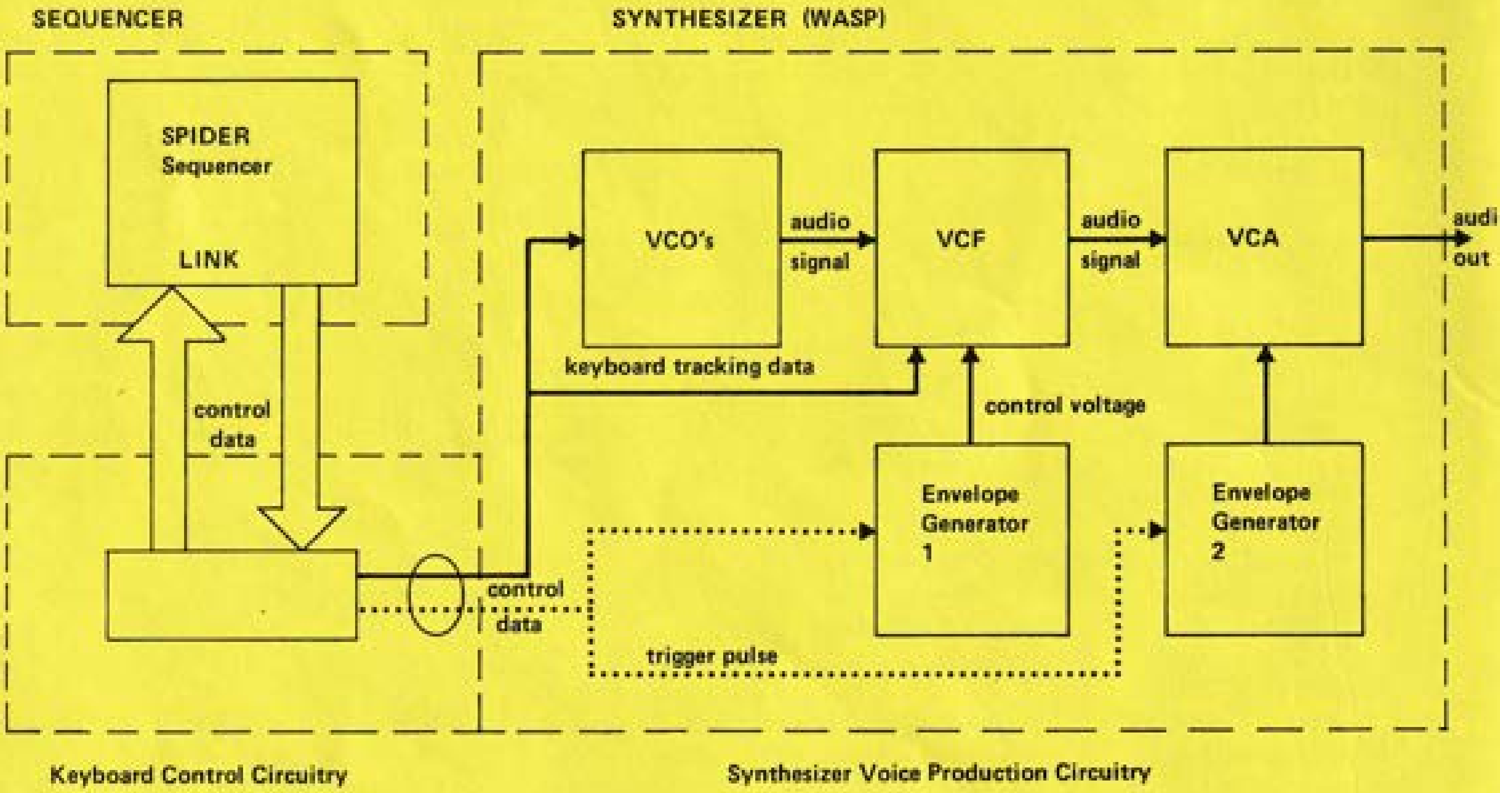


Fig. 2 SPIDER & WASP Interface

Needless to say, the SPIDER is a Digital Sequencer, and it incorporates some of the most sophisticated microprocessor-based circuitry available today.

Figure 2 shows basically how the SPIDER links into a synthesiser such as the WASP.

SECTION II. The SPIDER and the WASP.

Setting Up.

The SPIDER is specially designed to operate in conjunction with the WASP synthesiser. Although it is possible to control other synthesisers using the SPIDER, a WASP is required to program the sequence into the SPIDER's memory.

Let us assume for the moment that the SPIDER is to be used solely with the WASP. Firstly the SPIDER has to be supplied with electrical power. This can be supplied by either:

(a) A Battery. By removing the two screws on the underside of the instrument and lifting the battery compartment cover, one PP6 9-volt battery (Duracell or equivalent high-rated type) can be fitted. Make sure that the battery clip is securely attached. Replace the cover and screws.

(b) 9V d.c. Adaptor. Similar to that used for the WASP, this plugs into the small socket on the top panel labelled (1) in Figure 3. The adaptor should be rated for a current of 150 mA or more.

In the long run an Adaptor works out far cheaper than batteries. However if portability is required the battery will give a life of about one and a half hours.

Having applied power it is necessary to hook up the SPIDER to the WASP. Unlike most other Digital Sequencers which require three or four hookup cables, the SPIDER/WASP configuration requires only one and this is supplied with the SPIDER. If by any chance you lose this cable, it is known as a "270-degree 7-pin DIN to DIN lead".

This lead is fitted to the LINK socket on the SPIDER (labelled "2" in Figure 3) and to either of the LINK sockets on the WASP.

The free LINK socket on the WASP can be used to hook up a second WASP to the system, so that the SPIDER is driving two synthesisers. WARNING: two SPIDERS cannot be fed at the same time into a single WASP!

Real Time and Pulse Time.

Before we actually program a sequence it is important to understand what is meant by Real Time and Pulse Time, as this is an important aspect of the SPIDER.

When a sequence of notes is played on the WASP's keyboard they can be stored in the SPIDER's memory in one of two ways:

(a) They can be programmed so that they will play back just as they were played. In other words, each note will have its own particular length. You can record crotchets, minims, quavers and so on; every note will play back with the same duration as it was programmed. This is known as Real Time programming. It means what it says - "real".

(b) Pulse Time recording is different. No matter how each note is recorded, they will all have the same length on playback. This is useful if you want to get exact timings or to create specific fixed rythmic patterns. It also increases the note storage capacity of the device.

In Real Time the SPIDER can store a sequence of up to 84 notes. However in Pulse Time, because no memory is used up in remembering the length of each note, the capacity is expanded to a staggering 252 notes.

Programming a Sequence in Real Time.

Operating the SPIDER really is very simple, quite like using a tape recorder. First of all let's program a sequence in Real Time. With the WASP and SPIDER set up in front of you, work through the following routine:

(1) Switch on the WASP and SPIDER simultaneously.

(2) Set up a basic sound on the WASP, i.e. no modulation or glide etc.

(3) Switch the SPIDER to Real Time mode.

(4) Go into "record" mode by simultaneously pressing the RECORD and PLAY buttons.

(5) Carefully play the sequence of notes you wish to store in the SPIDER's memory. Note: the SPIDER will not start to record the sequence until the first note is played.

(6) Press the STOP button as soon as the sequence is complete. It is very important that the STOP button is pressed at precisely the right time, since this tells the SPIDER exactly how long the final note should last (this comes into play when sequences are to be repeated or cycled).

The sequence of notes which you played will now be stored in the SPIDER's memory. To recall the sequence simply press the PLAY button. The sequence will now sound through the WASP, just as it sounded when it was recorded.

To make the sequence repeat, i.e. cycle round continuously, set the REPEAT knob in the "on" position. The sequence will continue to play until the STOP button is pressed.

To play the sequence only once the REPEAT knob must be in the "off" position. The sequence will stop after the final note. To refire it, press the PLAY button again.

There is one point to bear in mind when recording in Real Time; the SPIDER will not store notes of length greater than 5 seconds. If you hold a note (or have a gap between notes) for longer than this, then during playback the next note will sound after only a 5 second delay. If it is vital to have a note lasting for more than 5 seconds, then you must repeat that note within the permitted time.

Recording a Sequence in Pulse Time.

This is just as simple as using Real Time. However there are a couple of extra facilities available - the DELETE and SPACE buttons. (These double as SLOW and FAST controls during playback, but we will deal with this aspect later). With the WASP and SPIDER switched on, step through the following procedure:

(1) Switch the SPIDER to PULSE TIME.

(2) Go into "record" mode by simultaneously pressing the RECORD and PLAY buttons.

(3) Play the desired sequence of notes, bearing in mind that they will all have the same duration when played back.

(4) If you require spaces in the sequence simply press the SPACE button. A high tone will sound as an acknowledgement, but during playback no note will sound for that step.

(5) If you make a mistake while recording in Pulse Time, it is possible to correct it. Press the DELETE button. The last note recorded will sound and at the same time will be removed from the sequence. So it is possible to step back through the sequence until the incorrect note is reached, at which point the rest of the sequence can be re-recorded.

(6) At the end of the sequence it is not necessary to press the STOP button. Simply go straight into playback mode by pressing PLAY. The sequence will then sound with all notes equally spaced.

(7) Another exciting feature of Pulse Time mode is that sequences can be built up bit by bit. To illustrate this, turn the REPEAT control off and record the first part of the sequence as above. Now play it back to check that it is correct. At the end of the sequence the unit will stop. At this point extra notes can be added to the sequence simply by playing them on the WASP.

(8) Press PLAY and the sequence will play right through including the new notes. When it stops, more notes can be added and so on. In this way a sequence can be expanded to the full 252-note capacity of the SPIDER.

Remember that in Pulse Time mode the SPIDER records only trigger pulses. Consequently the information stored will only tell the WASP's envelope generators when a note was played, not how long it was held. It is therefore necessary to adjust the DECAY/RELEASE controls on the WASP to suit.

For example, during a long slow sequence, unless the decay release time is long enough, one note will die away before the next one starts, even if when you programmed the sequence you held each note until the next one was played. In fact nearly all digital synthesisers perform in a similar fashion, and with intelligent use of the envelope controls of the synthesiser this facility can be put to good advantage.

We can now program our SPIDER in both Pulse and Real Time modes. The program will remain in the SPIDER's memory, even with the power turned off (as long as a battery is inserted), until a new sequence is recorded.

Playback with Variable Speed.

We have already learned about the Repeat mode during playback, enabling a sequence to sound over and over until the STOP button is pressed. But we can do much more that just repeating the sequence as it was recorded. We can speed it up and slow it down, using the FAST and SLOW buttons. To illustrate this:

(1) Record a sequence in Pulse Time mode.

(2) Switch REPEAT on and press PLAY.

(3) The sequence will now be heard to cycle. Press and hold the FAST button. The sequence will accelerate up to a maximum of 25 notes per second.

(4) Press and hold the SLOW button and the sequence will decelerate to a minimum of about 1 note per second. Exact speeds (tempos) can be set by releasing the FAST or SLOW button when the required speed is reached.

In Real Time mode a sequence can be replayed at a speed that is only the same or faster than that programmed. Of course the maximum speed possible depends on how fast the sequence was recorded, but the SPIDER will not play back faster than 25 notes per second.

Playback with Transposition.

Not only can you alter the playback speed but you can also transpose a sequence into a different key. The buttons marked SEMI, TONE, MAJ 3RD and PERF 5TH can be used to lower the pitch into any other key.

This is possible because the transposer has an additive effect. So if you hold the SEMI (semitone) and TONE buttons down at the same time, the pitch of the sequence will be lowered by a tone and a half. Table 1 shows how these buttons can be used to transpose into any key.

As an example, if the sequence was played in the key of C and it is to be transposed down an octave, the SEMI, MAJ 3RD and PERF 5TH buttons must all be held down.

The control circuitry of the WASP is designed to go down to the C sharp below bottom C on the keyboard. Therefore if you have programmed a sequence which includes the bottom C of the keyboard, it will not replay correctly if transposed by an octave or more.

An interesting quasi-random effect can be obtained by recording a sequence in Real Time and playing it back in Pulse Time mode. This completes the instructions for using the SPIDER with the WASP.

SECTION III. The SPIDER and OTHER SYNTHESISERS.

CV and Trigger Signals.

Although it is necessary to use a WASP (or WASP DELUXE) to program the SPIDER, it is possible for the SPIDER to drive more conventional synthesisers. For this purpose there is a pair of standard jack sockets mounted on the top panel of the SPIDER; they are marked TRIGGER OUT and C.V. (Control Voltage) OUT.

If you are considering using a SPIDER with some other synthesiser it is important to make sure that the two units are compatible. The control voltage produced by the SPIDER is the "one volt per octave" standard which most modern instruments use. The trigger pulse is switchable internally to provide either:

-- a "short to ground" (S-trigger) type of pulse for use with Moog instruments, or

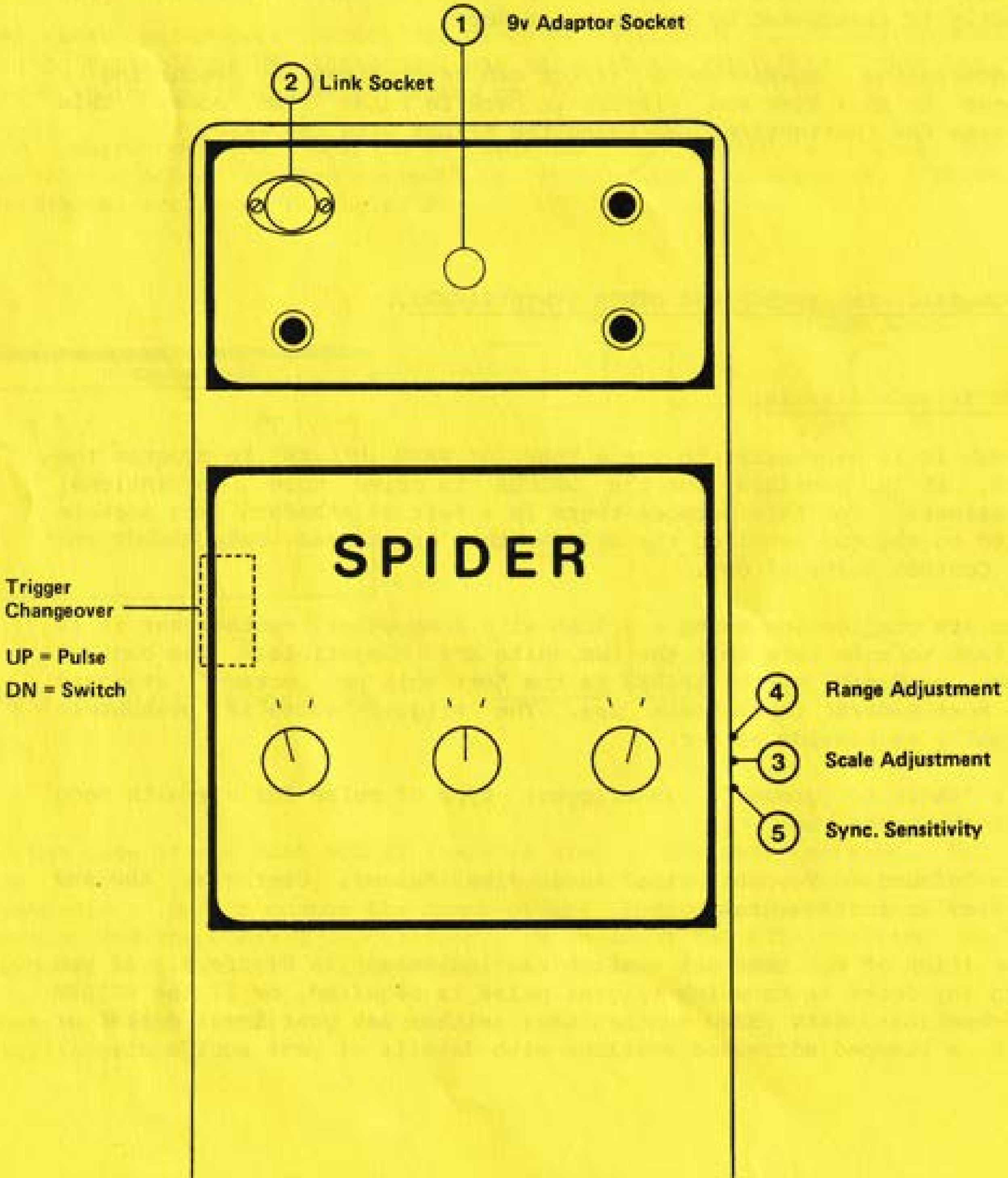
-- a "ground to 9-volt pulse" as used by Roland, Oberheim, ARP and similar instruments.

The position of the internal switch is indicated in Figure 3. If you are in any doubt as to which trigger pulse is required, or if the SPIDER is compatible with your synthesiser, either ask your local dealer or send us a stamped addressed envelope with details of your equipment.

TRANSPOSE CONTROLS

Semi	Tone	Major 3rd	Perfect 5th	Resultant Pitch	
–	–	–	–	C	
0	–	–	–	B	
–	0	–	–	B Flat	
0	0	–	–	A	
–	–	0	–	A Flat	
0	–	0	–	G	
–	0	0	–	F Sharp	
0	0	0	–	F	
–	–	–	0	E	
0	–	–	0	E Flat	
–	0	–	0	D	
0	0	–	0	D Flat	
–	–	0	0	C	
0	–	0	0	B	
–	0	0	0	B Flat	octave
0	0	0	0	A	

TABLE 1. **TRANSPOSITION GUIDE**



Tuning.

The tuning of almost every synthesiser is matched to the keyboard, so when using a SPIDER with a different make of instrument it is necessary to tune the SPIDER to match. For this purpose there are two preset screw adjustments which can be made on trimpots located on the righthand side of the SPIDER close to the REPEAT control. Figure 3 identifies the trimmers.

These should be adjusted with the aid of a small screwdriver - a jeweller's screwdriver is ideal. To tune the SPIDER to a conventional synthesiser is straightforward but care is needed to ensure perfect results. Follow this procedure:

(1) Hook up the WASP, the SPIDER and the synthesiser in question, and switch all units on.

(2) Switch the SPIDER to Pulse Time mode and play a top C on the WASP, followed by low C. Adjust the SCALE trimmer (labelled "3") so that the synthesiser sounds exactly a two octave range.

(3) Remove the C.V. lead from between the SPIDER and the synthesiser and play a C on the synthesiser's keyboard. Reconnect the C.V. lead and adjust the RANGE trimmer (labelled "4") so that the synthesiser sounds in the same pitch when a C is played on the WASP's keyboard as it did when the units were disconnected.

(4) As the two trimmers interact with each other to some degree, it is necessary to repeat Steps (2) and (3) several times until the SPIDER is tuned exactly to the synthesiser. When this is completed a scale played on the WASP's keyboard will sound identical to one played on the synthesiser with no external connections.

Interesting effects can be obtained by playing back a sequence through both a WASP and an additional synthesiser simultaneously.

Synchronisation.

A particularly useful feature of the SPIDER Digital Sequencer is its "sync" facility. This allows the user to record a "sync" track on a multi-track tape recorder (this can be any sharp pulse, e.g. a snare drum beat) which can be used to step the Sequencer through the programmed pattern. The advantage of this is that several sequences can be laid on top of one another using different tracks on the tape recorder.

To use this feature, the SPIDER has a SYNC socket to accept the desired pulse. A trimmer is provided next to the SCALE and RANGE trimmers, labelled "5" in Figure 3; this adjusts the threshold sensitivity of the SYNC input and allows the SPIDER to operate with all manner of "sync" pulses.

It is thus possible to use this feature not only with multi-track tape recorders, but also to have the SPIDER driven from a drum machine or even from a hand clap fed in through a standard microphone. The SPIDER is a truly versatile device.

ELECTRONIC DREAM PLANT

(OXFORD) Limited