

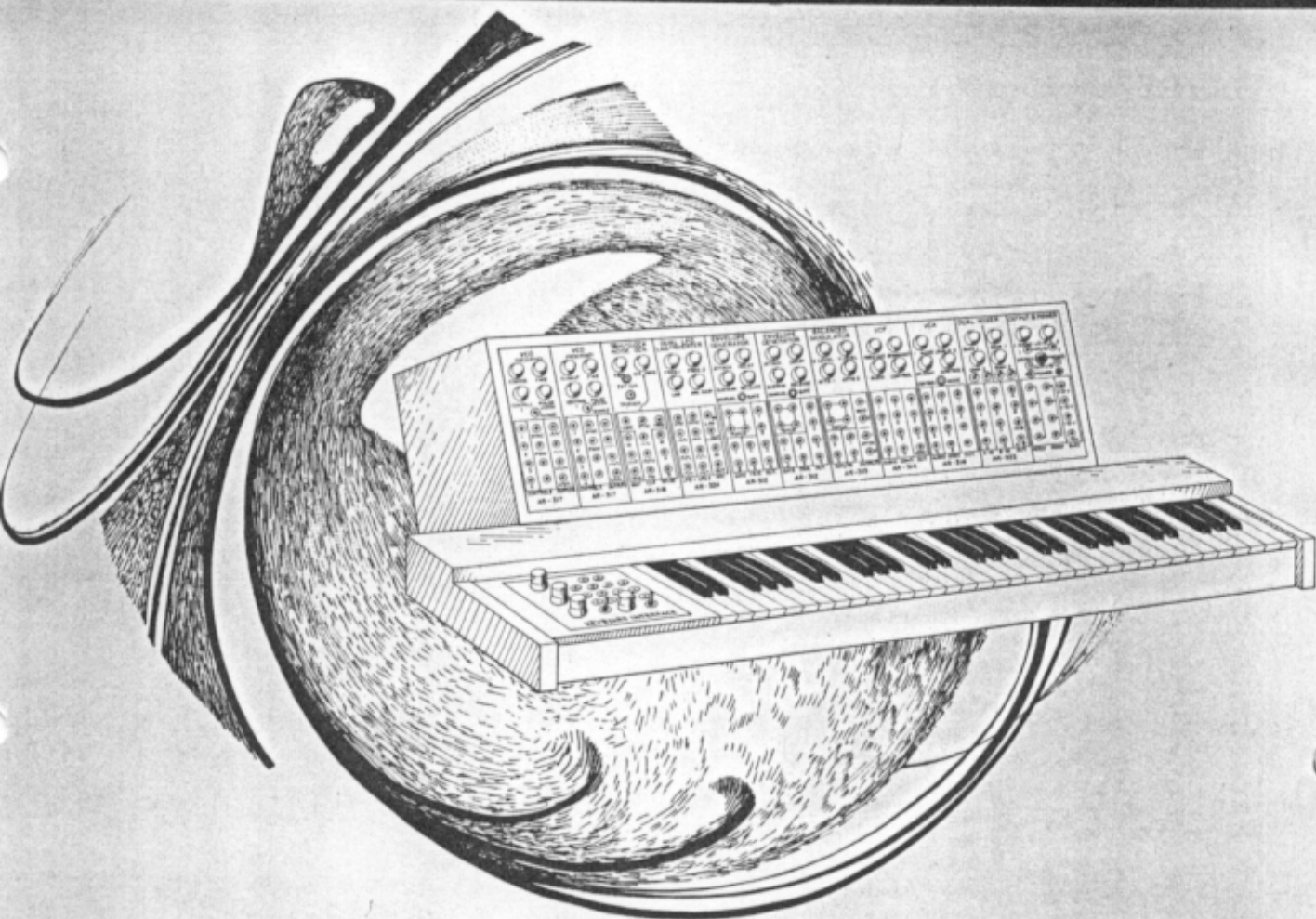


EXPLORE SOUND

The Aries System 300 Electronic Music Synthesizer

Welcome to the world of electronic music with the Aries Synthesizer. The System 300 is the most straightforward and universal sound synthesizer ever to be introduced. The modular "*Building Block*" approach allows you to expand as new technology becomes available. Start with a few economical modules and expand as your imagination demands. The Aries "*Building Blocks*" will allow you to express your creativity to its maximum because you will not be directed into preconceived ideas by a preconnected system. The Aries is certainly the system for now and for the future.

Aries Inc.
119 Foster Street
Peabody, MA 01960



High praise for the new ARIES MODEL 300 ELECTRONIC MUSIC SYNTHESIZER

A FEW OF OUR SATISFIED CUSTOMERS:

... The Aries Electronic Music Synthesizer is truly a spectacular value for its price and has the capability of other synthesizers in the \$3000 and up range. . . I truly admire the design of your VCO, the heart of any synthesizer. It wasn't clear at the outset just how versatile this unit can be. All the outputs are available simultaneously, due to the effective buffering of one output from another. Then to add to the flexibility of multiple control inputs, as well as pulse width and frequency modulation make for an oscillator that can do just about anything. The purity of the four output waveforms is excellent.

I am particularly fascinated by the variety of automatic tunes I can generate using the Sample/Hold unit triggered by the Clock. I'm just beginning to explore the virtually unlimited capabilities of the System 300, but it is one rare case nowadays when the advertising would have a hard time doing the product justice. . .

Eugene Endress, Trumansburg, N. Y.

... Tests done on my completed modules show the most perfect scope displays. Although I am not yet through with all the modules' construction, I know it will be a beautiful sounding instrument. I want to thank you and let you know I have complete confidence in the company.

Rob Levine, Ithica, N. Y.

... I love the VCOs: they are simple, practical, and accurate. I am impressed by the purity of the waveforms and the deceptive flexibility available. Kudos.

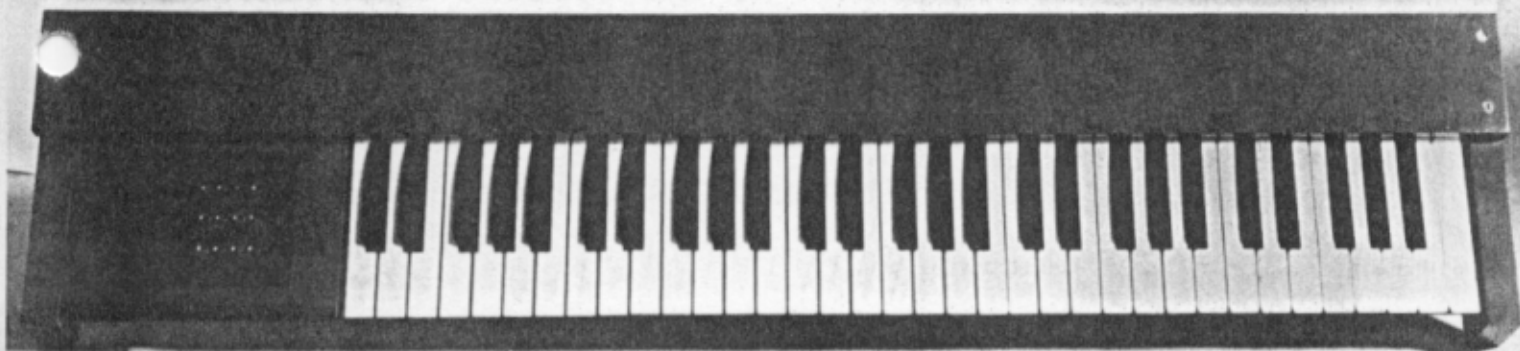
The Envelope Generators have expanded the time parameters to the point that they are doubly useful. The modulators are clear and the attenuators have been helpful. The Sample/Hold is extremely flexible and comfortable. . . I have become comfortable with the keyboard and enjoy the touch.

I'm primarily a musician and secondarily a "synthesist". I see the instrument as the most exciting and potentially universal ever to be produced.

David Gordon, Brighton, Mass.

ARIES, inc.
119 Foster Street
Peabody, Mass., 01960
(617) 532-0450

Aries Keyboard • AR-311 • AR-313 • AR-320



Keyboard Interface Keyboard Case Keyboard

- *Ultra Stable, Low Drift, Accurate Dual-Voice Outputs*
- *Full 5 Octave Range*
- *Exponential or Linear Portamento (glide) Selection*
- *1 Octave Range Tuning Control With Instant Zero Return*
- *Voice Outputs Are Linear Over Whole Range, For Maximum Flexibility With Aries Exponential Voltage Controlled Oscillators and Filters*
- *14 Output Jacks for Multiple Connections to Gate, Trigger, and Voice Outputs*

Aries 311 • 313 • 320 Specifications

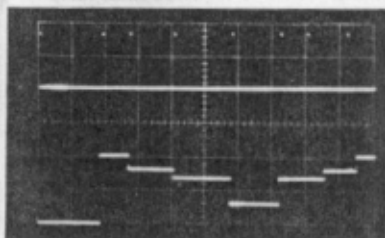
Gate Output:	+ 10V. whenever at least one key is depressed
Trigger Output:	± 10V., 1mS. pulse appears each time a key is depressed
Voice Output:	1 volt per octave, 5 octave range.
Aux. Voice Output:	1 volt per octave, 5 octave range
Tuning Range:	1.5V. = 1.5 octaves
Portamento:	Variable lag in voice output, 0 to 0.5 sec.
Output Impedance:	Gate — 1000 ohms, Trigger — 1000 ohms, Voice — 10 ohms
Controls:	Tuning, Portamento
Connections:	4 voice outputs, 4 gate outputs, 4 trigger outputs
Power:	+ 15.0 V. D.C. @ 10 mA - 15.0 V. D.C. @ 10 mA



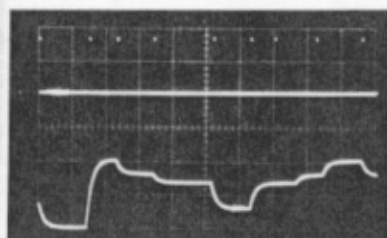
The AR-313 Keyboard has four outputs: Gate, Trigger, Voice and Aux. Voice. The Gate Output has a D.C. output of +10 Volts that remains on as long as at least one key is held down. The Trigger Output is a momentary pulse that appears only when striking a key. The Gate and Trigger are used to turn on the ADSR. The Voice Output has a D.C. level proportional to the lowest key being held down. It remains at the last level it had when no keys were depressed. The Voice Output is used to control the frequency of the Voltage Control Oscillators (VCO). With the Tuning Control at Center, the lowest key (C) provides 0 Volts output. The next key (C#) provides 1/12 Volts, and so on. Each octave (12 keys) adds 1 Volt, which raises the oscillator's frequency by one octave. The Aux. Voice Output provides a voltage only when more than one key is depressed. This voltage is proportional to the interval (number of keys) between the lowest and the highest key depressed. If it is plugged into a VCO control input (unattenuated, such as no. 2, 3, or 4) and the Voice Output is connected to another input, then this VCO will follow the highest key played. If another VCO is only connected to the normal Voice Output at the same time, then one can play two notes at the same time.

The Keyboard also has four controls: Tuning, Portamento, Portamento Mode, and Portamento On-Off. The Tuning Control adds or subtracts voltage from the main Voice Output. It has no effect at or near its center position. The Portamento causes a glide or time lag when going from one key to another. The Portamento Mode has a glide time about the same for small intervals and large intervals in the normal position. In the Linear mode, the glide takes longer for large intervals and is a more uniform glide. The Portamento On-Off Control allows the musician total control of when he desires to use this effect.

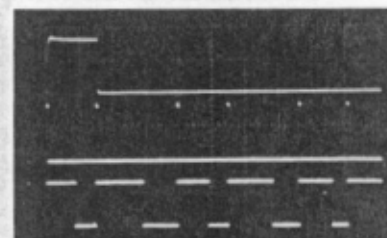
The Keyboard also contains two trims: Voice and Aux. Voice. These adjustments set the output intervals to 1 Volt per octave. They should normally not be needed but if necessary can be adjusted in five simple steps.



Top waveform shows Trigger output when Keyboard played rapidly. Bottom waveform displays same characteristics as picture on left with Portamento.



Displays same characteristics as picture on left with Portamento.

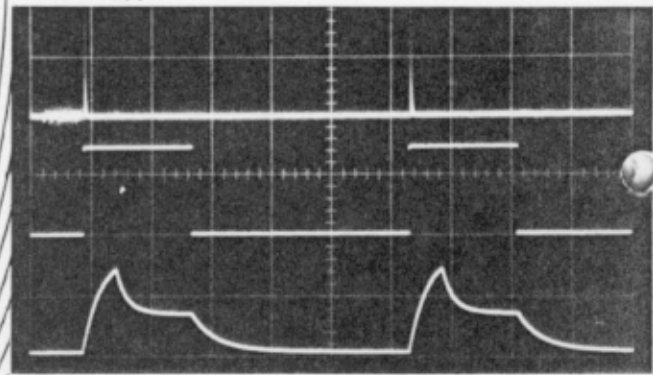


Top waveform shows Trigger output at 1mS per division. Center waveform at 50mS per division. Bottom waveform shows Gate output at 50mS

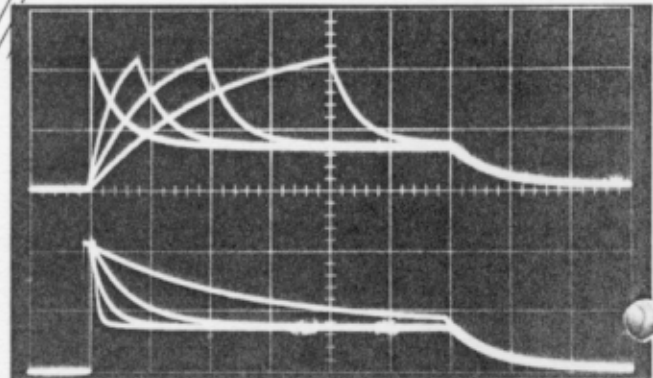
ENVELOPE GENERATOR ADSR AR-312



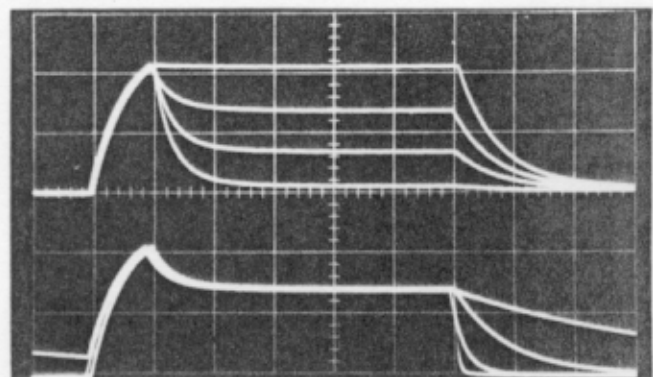
- 4 Independent Controls Over Dynamics of Each Note
- Attack, Decay, and Release Times Variable from .002 to 2 Seconds
- Variable Sustain Level, 0 to +10 Volts
- 4 Gate Inputs, 4 Trigger Inputs, and 4 ADSR Outputs
- Manual Gate Switch
- Compatible with ARIES Keyboard and Many Other Synthesizer Keyboards



Top waveform displays Trigger input. Center waveform displays Gate input. Bottom waveform shows two cycles of ADSR output.



Multiple Exposure of ADSR output. Top — 4 different Attack times. Bottom — 4 different Decay times



Multiple Exposure ADSR output. Top — 4 different Sustain levels. Bottom — 4 different Release times.

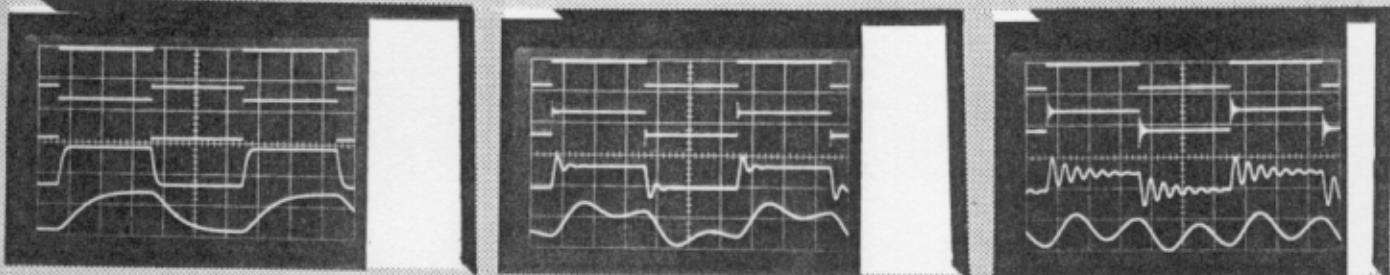
Envelope Generator Specifications

Attack Time:	2mS. to 4 sec.
Decay Time:	2mS. to 2sec.
Sustain Level:	0 to +10V.
Release Time:	2mS. to 2sec.
Gate Input Impedance:	100K ohms
Trigger Input Impedance:	33K ohms
Output Impedance:	1K ohms
Controls:	Attack, Decay, Sustain, Release, Manual Gate
Connections:	Gate Input, Trigger Input, Output
Power:	+15.0 Volts D.C. @ 4mA, -15.0 Volts D.C. @ 2mA.

The AR-312 Envelope Generator (ADSR) allows perfect control of the dynamics of your notes. Exact control over Rise and Decay can be obtained to achieve the precise sounds you are looking for.

The Envelope Generator provides a Control Signal which is usually used to turn on the Voltage Controlled Amplifier (VCA) or Voltage Controlled Filter (VCF). When connected to the Keyboard Gate and Trigger it provides an output whenever a key is depressed. The four controls of the Envelope Generator: Attack, Decay, Sustain and Release allow for changing the dynamics of the note. For Example; if the ADSR Output is connected to the VCA output with the signal at the VCA Signal Input (audio) then the output will rise from zero when a key (or the ADSR Manual Trigger) is depressed.

The rate of rise is set by the attack Control. It will then Decay (set by that control) until it reaches a level set by the Sustain Control. When the key is released the signal will decay to zero at a rate determined by the Release Control.



Top waveform in all 3 pictures displays 100 Hz Square wave input. Next wave is VCF output at 16 KHz Cutoff. Next wave is VCF output at 1 KHz cutoff. Bottom wave is VCF output at 250 Hz cutoff. Picture at left Q = 0.5, Center Q = 2, Right Q = 5

Voltage Controlled Filter • AR-314

- **Wide Range: 16Hz to 16,000Hz. Cutoff Frequency (entire Range of Hearing)**
- **Extremely Accurate, Stable, Uniform 1 Octave per Volt Control Characteristic Over Entire Range**
- **Variable Resonance or Peak-Ing Control Allows Cutoff Slope of from 12db. per Octave to Over 50 db. per Octave.**
- **4 Audio Inputs, and 4 Control Inputs Allow Flexible Mixing of Synthesizer Sources and External Sounds, such as Electrical Guitars.**
- **Variable Resonance Control Generates Boost for Timbre Control, as well as wah-wah and other effects**

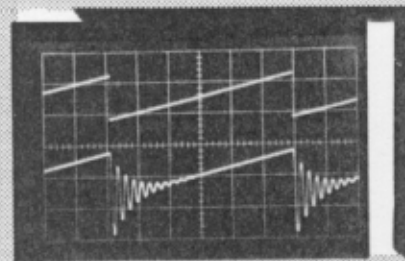
The AR-314 VCF allows dynamic control over the tone quality of synthesizer sounds, as well as external instruments such as electrical guitars. The VCF will accurately track with the oscillators when controlled from the Keyboard Voice, over the entire hearing range. Used with the Envelope Generator it can generate the dynamics of horns, violins, guitars, and other instruments. In addition, the Resonance Control can add swooping wah-wah effects and howling wind like sounds, due to its sharp frequency peaking ability.

Audio Signals are fed into any of its four input jacks (one has a level control) and mixed. These sounds are filtered and appear at the two output jacks.

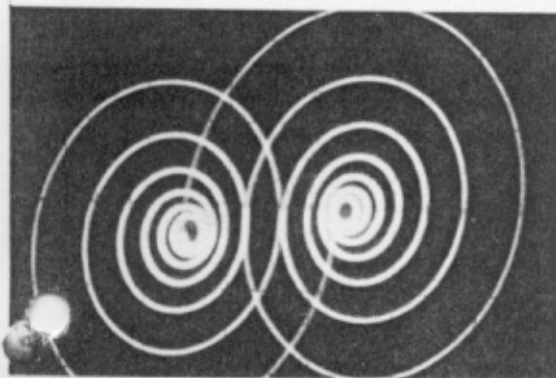
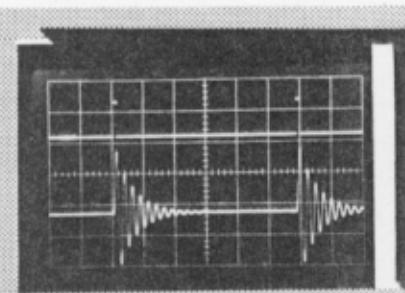
The VCF passes tones up to a certain pitch (cutoff frequency). Frequencies above this are attenuated (cut down in level).

Now, this cutoff point is manually adjustable by a knob. At 16 Hz (the left end) almost no signals within the range of hearing will get through. At 16 KHz (the right end), however, almost all such signals pass through unaffected. The filter is then "wide open". In between these extremes, the filter will modify the sounds of a waveform such as a pulse or sawtooth, or white or pink noise, because these have high frequencies called overtones or harmonics. Filtering these out makes the tone "duller". Of course, the Sine wave has no harmonics, so the filter cannot change its sound; it can only lower its level (amplitude).

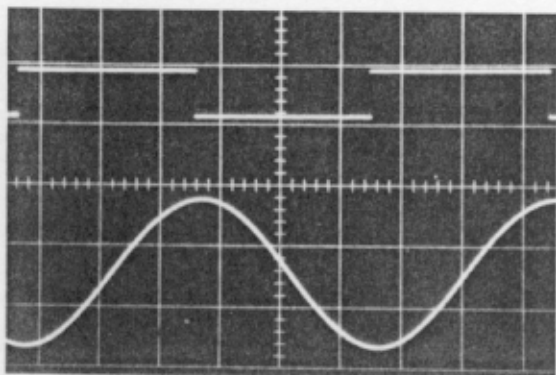
The cutoff frequency can also be voltage controlled. Any positive voltage such as an envelope Generator Output, applied to any of the four VCF Control Inputs, will raise the cutoff above the manual setting. Conversely, a negative voltage will lower it. (One of the Control Inputs has a level control.)



Top waveform is 100Hz Sawtooth input. Bottom is VCF output at 1KHz Cutoff Q=5. Photo below same, exc. pulse input.



Resonant Spiral Crossplot demonstrates relation between VCF input and output



Top waveform is 100 Hz Square input. Bottom Sine wave shows filtering of fundamental due to 100 Hz cutoff. Q = 5.

Voltage Controlled Filter Specifications

- Response Type:**
12 db/octave lowpass with adjustable peak ("Q")
- Cutoff Frequency:**
16 Hz to 16 K Hz
- Q (Gain at Cutoff Freq.):**
0.5 to 50
- Maximum Signal Level:**
± 10V. peak
- Signal to Noise Ratio:**
at least 70 db.
- Control Input:**
0 to 1 octave increase in Cutoff or Peak Frequency per Volt of Control Input.
- Signal Input Impedance:**
50 K ohm min.
- Control Input Impedance:**
50 K ohm min.
- Output Impedance:**
1 K ohm
- Tracking:**
When Control Input is Connected to the Keyboard, the Freq. of Cutoff or Highest Resonance will track the VCO's to Within a small Fraction of a Semitone over the Full 5 Octave Range
- Controls:**
Initial Freq., Resonance (Q), Signal Input, Control Input
- Connections:**
4 Signal Inputs (1 with attenuator)
4 Control Inputs (1 with attenuator)
2 Outputs
- Power:**
+ 15.0V. D.C. @ 28mA.
- 15.0V. D.C. @ 28mA.



Voltage Controlled Amplifier

316 Specifications

Maximum Signal Input:
± 10 V peak
Maximum Control Input:
+ 10 V
Gain:
0 db. to -100 db.
Frequency Response:
D.C. to 30 KHz. (-3db.)
Linear Control:
Gain = $\frac{\text{Control Voltage}}{10}$
Exponential Control:
Gain = $10^{\frac{V-10}{2}}$ = 10(V-10) db.
(10 db per volt) (V = control voltage)
Signal Input Impedance:
50 K ohms min.
Control Input Impedance:
50 K ohms min.
Output Impedance:
1 K ohm

Controls:
Signal Level 1, Signal Level 2, Initial Gain,
Control Level 1, Mode Switch (Lin. or Exp.)

Connections:
4 Signal Inputs (2 with attenuators)
4 Control Inputs (1 with attenuator)
2 Outputs

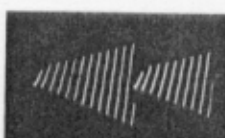
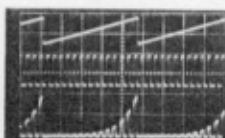
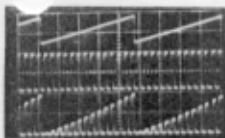
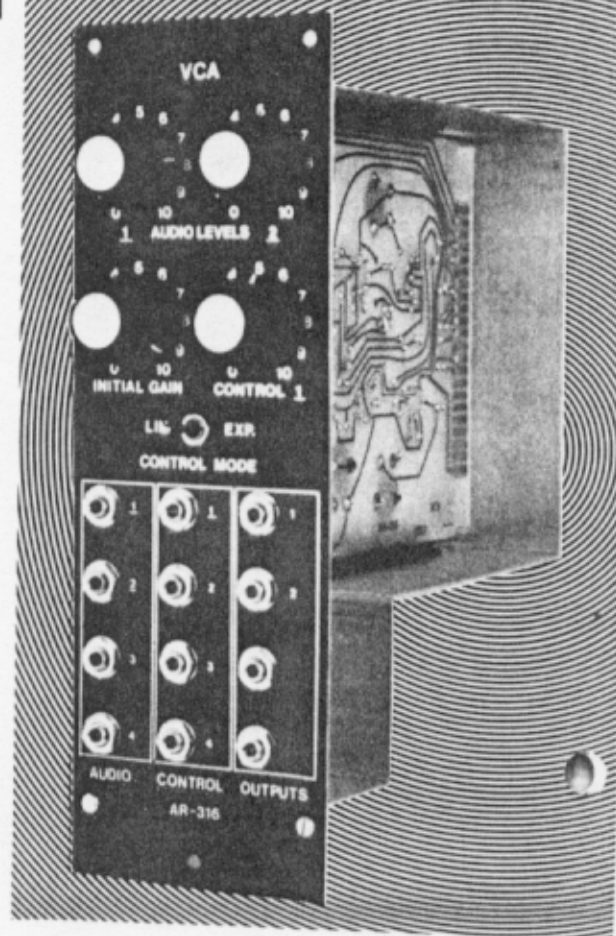
Power:
+15.0 V D.C. @ 6 mA
-15.0 V D.C. @ 6 mA

AR-316

- **Wide Range — Over 100 db of Accurate Gain Control**
- **Linear or Exponential Mode Switch**
- **4 Audio Inputs, (2 With Level Controls)**
- **4 Control Inputs, (2 With Level Controls)**
- **Frequency Response DC to 30 KHz**

The AR-316 Voltage Controlled Amplifier (VCA) allows dynamic control of the loudness of a sound, both from the synthesizer and from external instruments.

When controlled from the AR-312 Envelope Generator, the VCA contours the attack, decay, sustain, and release properties of a note. In addition, the VCA can produce tremolo and other types of amplitude modulation when driven from an oscillator (AR-317) waveform. The linear mode results in a gain directly proportional to the control voltage. In the exponential mode, the number of decibels of gain changes in proportion to the control voltage.



Top waveform shows Sawtooth Control input, Linear Mode. Center shows Signal input. Bottom is VCA output.

Same waveform as the picture to left except Exponential Control Mode.

VCA output, Linear Mode, with low frequency Sawtooth control and high frequency Sawtooth input.

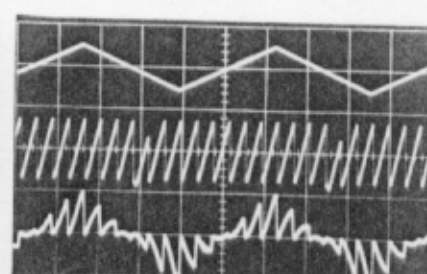
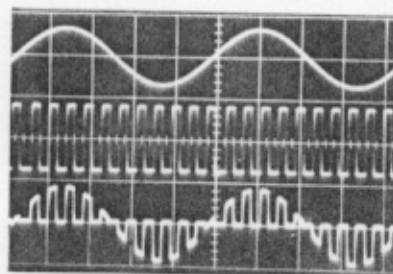
Balanced Modulator & Attenuators AR-315

AR-315 Specifications

Frequency Response:
D.C. to 20 KHz (-3db)
Maximum Input Level:
± 10 V peak at Y and X inputs
Signal to Noise Ratio:
80db
Signal Feed Through:
Less than 1%, Y and X inputs
Input Impedance:
20 K ohms, Y and X inputs
Output Impedance:
1 K ohm

- **Generates Inharmonic Tones Resembling Bells, Gongs, and an Assortment of Eerie Space Sounds**
- **Balanced (ring modulator) Operation Allows Electrical Musical Instruments to be Plugged In**
- **Level Control On Each Input**
- **Wide Range — D.C. to 30 KHz.**
- **May Also be Used as a VCA**
- **Module Has Two Independent Attenuators (Level Controls) with Own Input and Output Jacks**

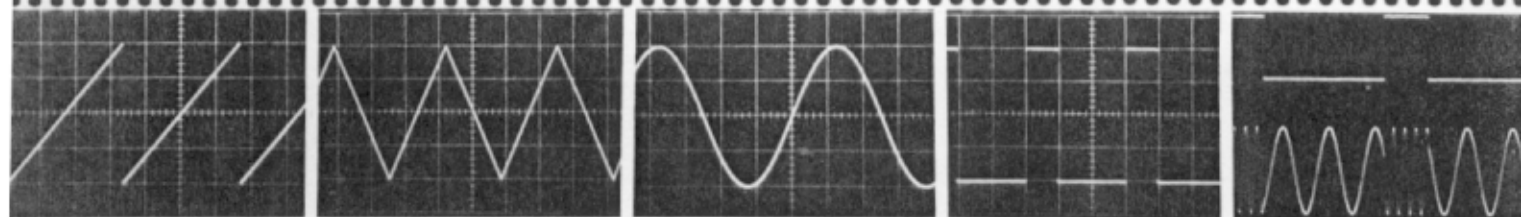
The AR-315 Balanced Modulator is a device which multiplies two input voltages together, producing a complex tone at the output. The Modulator can be used for a wide variety of sound generation, and amplitude modulation effects. It can be used as a VCA by connecting one input to an audio signal and the other input to a control signal. Complex envelopes may be generated by modulating an Envelope Generator (AR-312) output with an oscillator waveform (AR-317) or with another envelope signal.



Top waveforms show X input. Center waveforms show Y input. Bottom waveform Balanced Modulator output.



Aries Voltage Controlled Oscillator • AR-317



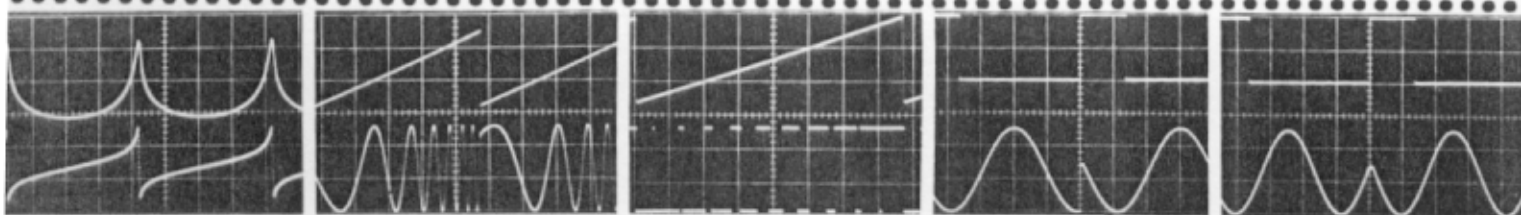
Sawtooth wave

Triangle Wave

Sine Wave

Pulse Wave

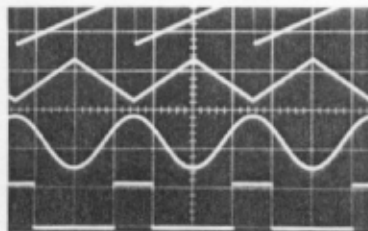
FM of Sine wave by Pulse.



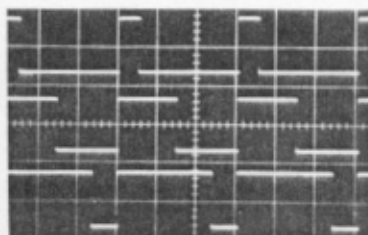
self frequency modulation (FM). FM: Upper waveform Sawtooth. Lower waveform Sine wave. Controlled by Sawtooth. Pulse with modulation (lower waveform) by Sawtooth (upper waveform). Synchronizing of Sine wave (lower waveform) by Pulse wave (upper). Same characteristics as picture to left except for change in Sine wave frequency.

- **Wide Range: Less Than 1 Cycle per Minute to Over 50,000Hz (Cycles per second) in Two Ranges**
- **Extremely Accurate: Oscillators Track Together in Tune Over Entire Hearing Range**
- **No Drift: Fully Temperature Stable**
- **Very Pure Sine Wave Plus Sawtooth, Triangle, and Variable Width Pulse (square) Waves Simultaneously Available**

- **Phase Synchronizing (sync) Input**
- **Pulse Width Modulation Input Gives Phasing and Chorus Effects**
- **4 Control Inputs (1 Octave per Volt)**
- **1 Control Input Attenuator**
- **Coarse and Fine Frequency Control**
- **Pulse Width Control (0 to 100%)**



Displays VCO phase relationship.



Displays 3 different VCO pulse widths: 20%, 50%, 80%.

The AR-317 Voltage Controlled Oscillator (VCO) is an extremely versatile package which represents a major improvement over other oscillators. It generates all the basic synthesizer waveforms simultaneously: sawtooth, triangle, variable width pulse (square) and sine. An engineering breakthrough in sine converters provides a pure, low distortion sine wave, which allows really clean balanced modulation.

Contrary to synthesizer kits which use linear oscillator control, the AR-317 VCO, along with the AR-314 VCF, uses accurate full range exponential control. Only this type provides 1 octave per volt (1/12 V per semitone) control of frequency over the entire range of hearing. Only exponential control (with a linear keyboard, such as the AR-313) allows unlimited flexibility in controlling any number of oscillators from any number of sources.

The AR-317 VCO has 4 control inputs, 1 of which has a level control. Its 1 octave per volt characteristic means that signals may be summed, and each positive volt doubles the frequency, and each negative volt halves it, over an extremely wide range.

A Sync input allows any external square or pulse wave to drive the VCO at exactly the same frequency, or any multiple (harmonic) of the external source. This can generate all sorts of unique speech-like tones. In addition, the width, or duty-cycle of the pulse wave may be voltage controlled (modulated) from an external source.

The AR-317 VCO also has many uses in the electronic lab; ie; as a function generator, audio sweep oscillator, frequency response tester, transient generator.

The low frequency range, together with the Sync feature, can be used to create unique envelope signals and vibrato type modulation waveforms.

Voltage Controlled Oscillator Specifications

- Frequency Range:** Manual Control, two ranges 0.03 Hz to 30 Hz, 16 Hz to 16 KHz. May be driven by voltage control from 1 cycle every 10 minutes (0.002 Hz) to 50 KHz typically.
- Control Inputs:** 0 to 1 octave per volt.
- Control Input Level:** ± 10 V max.
- Sync Input:** Positive going edge triggers all waveforms to reset. Requires at least 2V. Max Level = 10 V.
- Pulse Width:** Variable 0 to 100% duty cycle. (50% = Square Wave)

- Pulse Width Modulation:** 10% per Volt. Maximum Input = ± 10 V.
- Sine Wave:** Many Synthesizers only provide a roughly shaped approximation to a sine wave. The ARIES VCO incorporates a significant advance in waveform converter circuitry which provides a very clean, low distortion, pure sounding sine wave.
- Frequency Accuracy and Tracking:** The oscillators will track one another, and follow the keyboard scale in tune over the whole audible range of 16 Hz to 16 KHz to within a small fraction of a semitone.

- All Input Impedances:** 50 K ohms min.
- Output Impedance:** All outputs, 1 K ohm
- Control:** Coarse Frequency, Fine Frequency ($\pm 1/2$ octave), Control Input 1, Pulse Width
- Connections:** 4 Control Inputs (1 with Attenuator), Sync Input, Pulse Width Modulation (PWM) input, 4 waveform outputs
- Power:** + 15.0 V D.C. @ 36 mA, - 15.0 V D.C. @ 36 mA



AR-317