

**VOLTAGE CONTROLLED ADSR**

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**SPECIFICATIONS**

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POWER REQUIREMENT:	+15v. @ 11 ma.
TIME CONTROL SCALE:	1 decade/volt nominal
TIME @ 0 CONTROL VOLTAGE:	0.3 ms.
OUTPUT AMPLITUDE:	0 - 5 v.

The EKx-10 Voltage Controlled ADSR is a typical application of the CEM 3310 Envelope Generator Integrated Circuit. Support circuitry has been added to allow the device to respond to positive going control voltages by increasing the time involved in the parameter being controlled. Dual summing inputs have been added to each of the time parameter control pins and an output buffer provided. A trimmer has been added to allow precise setting of the CEM 3310's internal maximum sustain level set point.

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**PARTS LIST**

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- 1 - 18K resistor (brown-grey-orange)
- 1 - 68K resistor (blue-grey-orange)
- 2 - 100 ohm resistor (brown-black-brown)
- 4 - 10K resistor (brown-black-orange)
- 4 - 680 ohm resistor (blue-grey-brown)
- 9 - 100K resistors (brown-black-yellow)
- 1 - 50K trimmer resistor
- 1 - .01 mfd. ceramic disc capacitor
- 1 - .01 mylar capacitor
- 4 - .005 mfd. disc capacitor
- 2 - 33 mfd. / 16 v. electrolytic capacitor
- 1 - 14 pin DIP socket
- 1 - 16 pin DIP socket
- 1 - 4136 op amp
- 1 - CEM 3310
- 1 - 16 inch length of bare wire
- 1 - EKx-10 printed circuit board

## ASSEMBLY

As mentioned in the PAIA Technical Services note which accompanies the Curtis Chips, care during assembly is essential to fully realize the wide operating range possible from these state-of-the-art devices. CLEAN the circuit board thoroughly with steel wool or Scotch Brite pads prior to assembly, a clean board is essential for proper solder adhesion. When assembly is complete, clean all rosin left over from soldering from the board using Acetone, denatured alcohol or some similar solvent.

Following the parts placement diagram to the right and the designators printed on the circuit board, install the components.

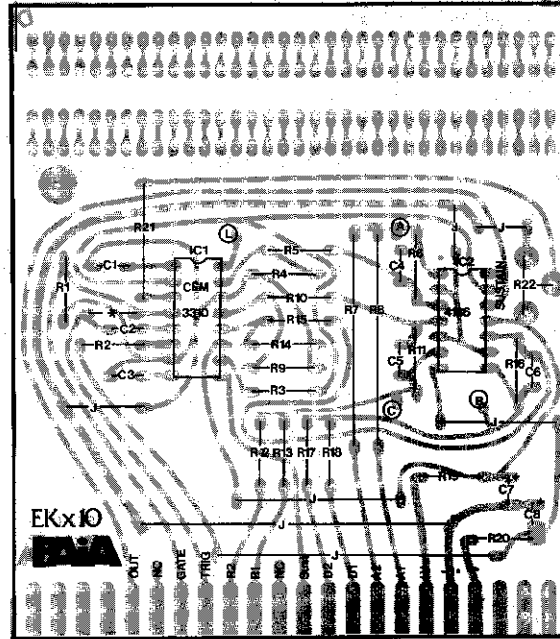


Figure 1

### FIXED RESISTORS

DESIGNATION	VALUE	COLOR CODE
( ) R1	10K	brown-black-orange
( ) R2	680 ohms	blue-grey-brown
( ) R3	18K	brown-grey-orange
( ) R4	680 ohms	blue-grey-brown
( ) R5	10K	brown-black-orange
( ) R6	100K	brown-black-yellow
( ) R7	100K	brown-black-yellow
( ) R8	100K	brown-black-yellow
( ) R9	680 ohms	blue-grey-brown
( ) R10	10K	brown-black-orange
( ) R11	100K	brown-black-yellow
( ) R12	100K	brown-black-yellow
( ) R13	100K	brown-black-yellow
( ) R14	680 ohms	blue-grey-brown
( ) R15	10K	brown-black-orange
( ) R16	100K	brown-black-yellow
( ) R17	100K	brown-black-yellow
( ) R18	100K	brown-black-yellow
( ) R19	100 ohm	brown-black-brown
( ) R20	100 ohm	brown-black-brown
( ) R21	68K	blue-grey-orange

#### TRIMMER RESISTOR

- ( ) R22 50K Trimmer

#### CAPACTORS

- ( ) C1 .01 ceramic disc  
( ) C2 .005 ceramic disc  
( ) C3 .01 mylar  
( ) C4 .005 ceramic disc  
( ) C5 .005 ceramic disc  
  
( ) C6 .005 ceramic disc  
( ) C7 33 mfd. / 16v. electrolytic  
( ) C8 33 mfd. /16v. electrolytic

#### MISCELLANEOUS

- ( ) Using the bare wire provided, form and install the 7 jumpers indicated by solid lines broken with the letter "J" on the parts placement graphics.

NOTE: The jumper indicated by the solid line broken with an "\*" should not be installed at this time. The use of this jumper is discussed in a later part of this manual.

- ( ) Install the 16 pin DIP socket at the location marked as IC1. Observe the polarizing notch on the socket.  
  
( ) Install the 14 pin DIP socket at the location market as IC2. Observe the polarizing notch on the socket.

#### INTEGRATED CIRCUITS

- ( ) Install the CEM 3310 IC in the socket at IC1. Observe the polarizing notch.  
  
( ) Install the 4136 type quad op-amp in the socket at IC2. Observe the polarizing notch.

THIS COMPLETES ASSEMBLY OF THE EKx-10.

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## CALIBRATION

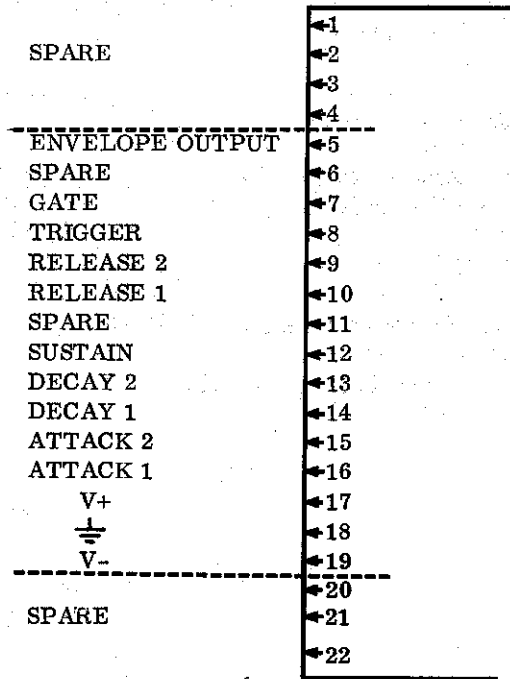
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The only calibration required of the EKx-10 is the adjustment of the peak sustain voltage. Adjust the SUSTAIN trimmer R22 for a reading of +5v. on pin 3 of IC 1. See also CEM 3310 data sheet "Use of the Attack and Threshold Voltage Output Pins".

## USING THE EKX-10

The edge connector pads on the EKx-10 have these labels and uses:

- 1 - 4 SPARE pins.
- 5 EVNELOPE OUT - The ADSR waveform appears on this edge connector pad. Peak envelope voltage is 5 volts.
- 6 SPARE
- 7 GATE - This edge connector pad accepts a logic level signal (2.4 volts or greater) which in conjunction with the trigger signal controls the state of the ADSR. In essence, a high voltage level causes the circuit to be in the sustain mode while a low level (less than 2.4v.) allows the output to return to 0 volts.
- 8 TRIGGER - A narrow positive going voltage pulse applied to this input initiates the ADSR response. If the EKx-10 is being used with equipment which provides only a gate signal without a separate trigger, the jumper marked with an "\*" should be installed. For complete details on the functioning of the GATE and TRIGGER signals, see the CEM 3310 data sheet.



EKx-10 EDGE CONNECTIONS  
(From component side of card)

Figure 2

- 9, 10      RELEASE - The sum of the voltage applied to these two connector pads determines the rate of change of the Release (final decay) portion of the ADSR waveform. While control scale is specified as nominal 1 decade/volt, it is in fact slightly greater than this. A sum of 0 volts produces a .3 ms. release time and 5 volts produces a release time on the order of 30 sec. For maximum accuracy the sum of the voltages should be from 0 - 5 volts.
- 11          SPARE
- 12          SUSTAIN - The voltage applied to this connector pad sets the voltage level maintained during the sustain portion of the ADSR waveform on a 1:1 basis.
- 13, 14      DECAY - The sum of the voltages applied to these two connector pads determines the rate of change of the Decay (initial decay) portion of the ADSR waveform. Control scale is as outlined in RELEASE, above.
- 15, 16      ATTACK - The sum of the voltages applied to these two connector pads determines the rate of change of the Attack portion of the ADSR waveform. Control scale is as outlined in RELEASE and DECAY, above.
- 17          V+ - A well regulated +15 volt supply should be connected to this connector pad.
- 18          GROUND - System ground, common point for the bipolar power supplies and reference for all control voltages.
- 19          V- - A well regulated -15 volt supply should be connected to this edge connector pad.
- 20 -22      SPARE

There are 4 labeled points on the EKx-10 circuit board:

- "A" This is the summing node for the attack control voltages. If desired, additional summing resistors may terminate at this node to provide more control voltage inputs.
- "B" This is the decay input summing node.
- "C" This is the release input summing node.
- "L" This is the CEM 3310's ATK OUT pin and may be used to generate an attack phase logic signal as outlined in the CEM 3310 data sheet.

# SCHEMATIC

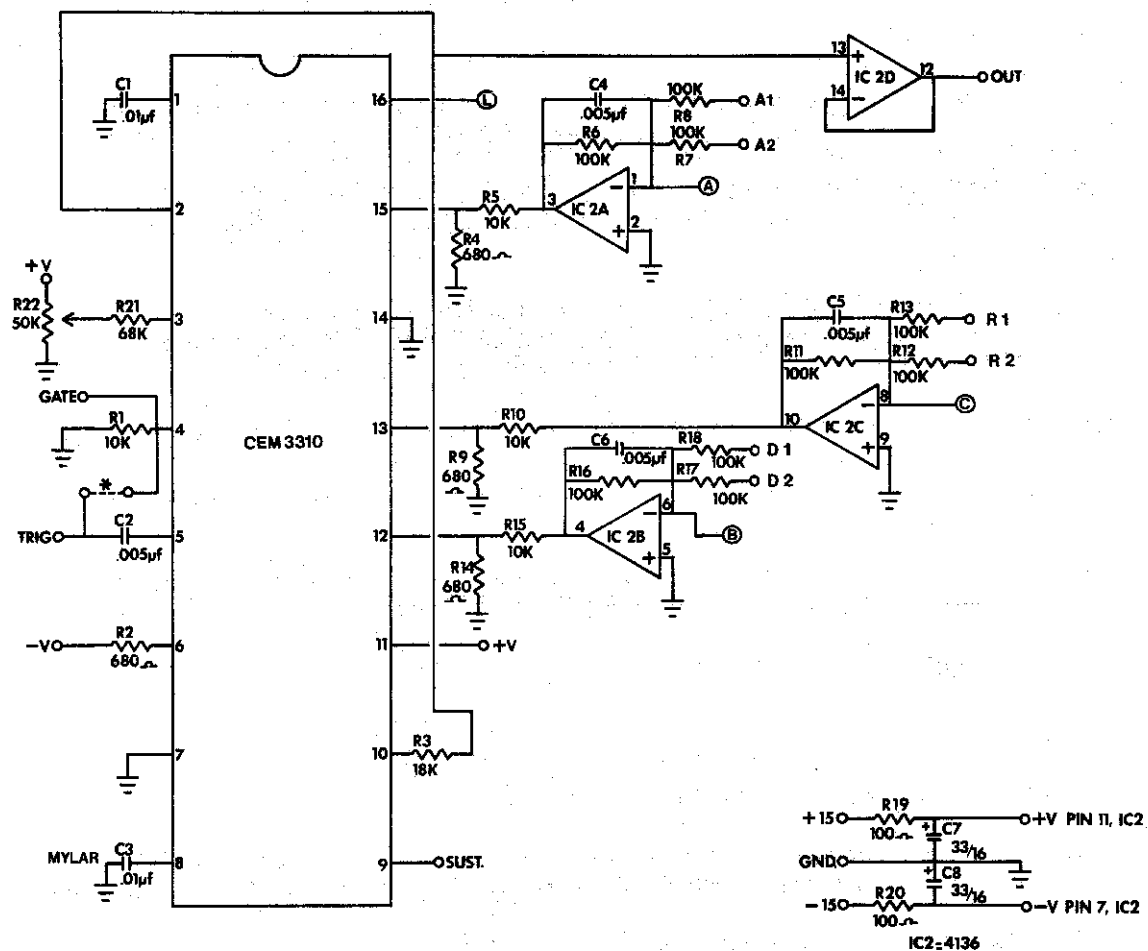


Figure 3