NEW PATTERN GENERATOR MK II

SERVICING NOTE: THIS WAS DONE AT THE BEGINNING. NOT ALL MODULES WERE TESTED AND DESCRIPTIONS ARE NOT 100% CORRECT. - BILL HEARN 4/18/92

1. SEQUENCED VOLTAGE SOURCE.

A module to be used in multiples; at least 4 required. SEE INSTRUCTIONS ON PATCHING FOR SEQUENCER INPUTS. INTERNAL TIMING 1-SHOT 200 usec ON. WHEN IT IS "ON" INTERNALS WILL PUT OUT 10 INDIVIDUAL VOLTAGES BETWEEN +10 AND -10 VOLS. IT ALSO PUTS OUT A 20 usec TIMING PULSE WHEN IT TURNS ON AND A LOW VALUE INDICATING IT IS "ON".

THE 10 ANALOG OUTPUTS ARE ARRANGED TO PRESENT A HIGH SOURCE IMPEDANCE WHEN "OFF" SO THAT THEY MAY BE "WIRE OR" CONNECTED WITH OTHER MODULES.

THE ANALOG OUTPUTS MAY BE SELECTED BY A SWITCH AT EACH OUTPUT TO SELECT WHETHER THE MODULE IS "ON". THE OUTPUT MAY BE USED TO CREATE A TIMING PULSE, OR AN EXTERNALLY APPLIED VOLTAGE OR SIGNAL.

2. VOLTAGE CONTROLLED FUNCTION GENERATOR

A function generator putting out sine, square, triangle, ramp, and pulse waveforms. OUTPUT FREQUENCY IS PROPORTIONAL TO AN INPUT VOLTAGE; OUTPUT VOLTAGE IS PROPORTIONAL TO THE WAVEFORM. THE WAVEFORM MAY BE MODIFIED AT ANY TIME BY APPLYING A TIMING PULSE AT THE TIME THE OSCILLATOR RECEIVES THE TIMING PULSE, IT SETS THE PHASE OF ITS WAVEFORM ACCORDING TO THE VOLTAGE PRESENT AT ANOTHER ANALOG INPUT.

3. FIXED FILTER BANK QUADRIFIBER SPECTRUM INTO 8 BANDS, PROVIDES 8-INPUT MIXERS FOR COMB FILTER PATCHING.

4. DIGITALLY CONTROLLED ADDER/SUBTRACTOR.

3. Voltage Controlled Amplifier.

Gain is controlled by an external analog voltage: 5 volts in correspondence to a gain of exactly 1. Maximum gain is 15 db at 10 volts in. Gain is zero for inputs of 1200 to 1600 millivolts.

Voltage Controlled phase shifter:
The 90° phase shift frequency is directly proportional to an analog input level (10June 2 to 10June 3).

Four quadrant multiplier.

Cout = \( e_1 \cdot e_2 \) or \( \frac{e_1}{e_2} \), switched.

6. Voltage Controlled Mixer.

To be used as output mixer for XRF-1. Has 24 signal inputs and 24 control inputs. Gain on each input is 1 for a control input of 5 volts.

7. Output Circuit

Provides for image rotation, vertical and horizontal movement by means of trigger signals, Color and Phase modification.

Voltage controlled linear envelope generator (with long indicator)

Rise time, duration, and fall time are directly proportional to analog input voltages. Sequence is initiated by trigger pulse. Output level is 4.5 volts.

Variable trigger delay

Delay trigger pulse an amount proportional to an input control voltage.

ENVELOPE FOLLOWER provides detection of envelope of music or other waveforms. Contains voltage controlled gain and internally adjustable gain.
General Rules - MK II pattern generator:

1. All logic levels are active in the OV level, that is, negative logic is used when patching between modules. This is so that all logic connections may be wire-or connected.

   The standard logic is current sink DTL; all outputs are either resistive pullup or bare collector.

2. Analog outputs in the sequencer operate similarly to wire-or logic, as explained in previous page.

Banana jacks are color coded as follows:

- Red: Analog output
- Blue: Analog input
- Black: Digital input
- White: Digital output

Square pulses are 50 microseconds long, always generated by...


NOTES:
- R1 trimmed and trimmed for unity gain at 45V in.

Calculations for VCA:
- \[ \frac{1}{G_{m1}} = \text{intrinsic emitter to emitter resistance} \]
- \[ \frac{1}{\frac{I_{E2}}{V}} = \frac{1}{204} \]

where \( I_{E2} \) is the current source current.

Case 1: Vout = 0
- For input = 0, Vout = 45V.

Case 2: 
- Vout = 0 for input = 45V.
1. Apply 10V sine wave to input, adjust cal 1 for signal cancellation at output.
2. With +10V on control input, adjust level of 1kHz input sine wave to give 1V off cut. With control input grounded, adjust cal 2 for 1V off cut.
3. With no signal input, and with signal input grounded, adjust cal 3 for 2V off volt output.
SEQUENCES operation:

To set up a 6-stage 10 output sequencer, first make a flag counter by pairing "Eos out" of one module (next to red button) to the "EXT Timer pulse in" input of the module below it (This jack is not leveled, but is to the right of the "Timing Source" switch).

The Eos out pulse of the lowest stage goes back to the "EXT Timer pulse in" input of the top stage. You can now start the sequencer by pressing the top red button. Adjust duration by "Duration" encoder for each section.

Now, analog voltages will appear at the red jacks on the right of the panel.

You have "WIRE OR" these voltages by connecting them in parallel. In this case, the voltage put out will come from the row of knobs whose "Eos" light is on.

Example:

You will need 50 even 4" molded, stacking banana cords to get 10 sequenced voltages, 6 state stages.
VOLTAGE CONTROLLED FUNCTION GENERATOR FOR MARK II PATTERN GENERATOR.

AC Voltage 15 kHz out for
200 kHz square wave. (Circle) with HP 3469A analog

Notes:
1. R, C, determined empirically. Use 250 ± 10% initially.
2. Q5 is a PNP Darlington output stage similar to T.I. SN55846 or SGN340.
3. Q10 is a PNP transistor. Q14, Q15 are hand-crafted, t in
   components vary (varying for others).
Precision four quadrant multiplier

1. $V_1 = 4 V$, $V_2 = 1 V$, $V_3 = 2 V$. Adjust $C_1$ for null.
2. $V_1 = 4 V$, $V_2 = 1 V$, $V_3 = 2 V$. Adjust $C_2$ for null.
3. $V_1 = 4 V$, $V_2 = 1 V$, $V_3 = 2 V$. Adjust $R_5$ for zero output.

$$R_{11} = 150 k \Omega, \quad R_1 = 3 k \Omega,$$
$$\frac{V_3}{V_2} = 10 k \Omega,$$
$$R_2 = 470 k \Omega, \quad 20 k \Omega,$$
$$R_3 = 68 k \Omega,$$
$$R_4 = 12 k \Omega.$$
REDESIGNED POWER SUPPLY FOR GRAPHIC SYNTHESIS