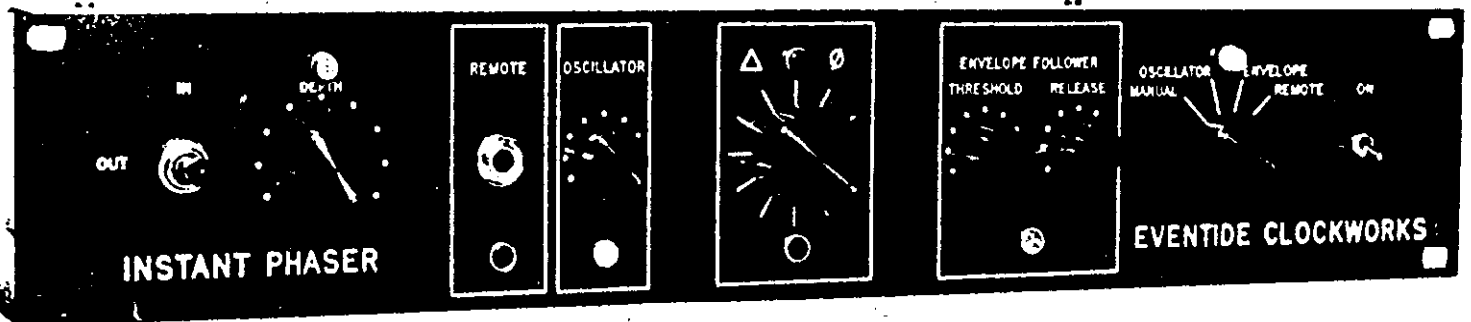


# Eventide

the next step

INSTANT PHASER  
MODEL PS 101  
INSTRUCTION MANUAL



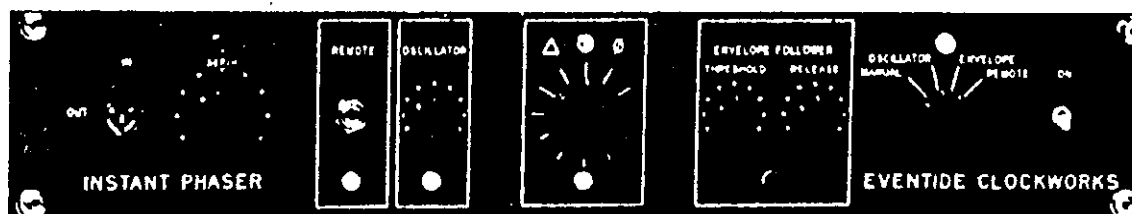
## SPECIFICATIONS

NOTE: ALL SPECS APPLY WITH THE "IN-OUT" KEY IN THE "IN" POSITION. WITH THE KEY IN THE "OUT" POSITION. THE INPUT SIGNAL IS BYPASSED DIRECTLY TO THE OUTPUT.

Input level	+18 dbm maximum.
Input impedance	10K ohm nominal, unbalanced to ground, unless option O4 (transformer) installed.
Output level	Depth control fully counter-clockwise: identical to input <u>+1</u> db. Depth control fully clockwise: varies with frequency, average program level identical to input for complex signal.
Output impedance	50 Ohms nominal, suitable for driving load of 300 ohms or greater to full output. Signal unbalanced to ground unless option O4 is installed.
Gain	Unity.
Frequency response	Depth control fully counter-clockwise: <u>+ 1/2</u> db, 50-20K Hz. Depth control fully clockwise: -20 to +6 db depending upon input frequency and phasing control setting.
Distortion	Less than 1 % at +4 or +8 dbm.
Signal to noise ratio	Better than 64 db.
Oscillator, Internal	Variable from .1 Hz to 10 Hz.
Envelope follower threshold	-6 db peaks required for full phasing with threshold control fully clockwise.
Release time	Variable from .1 second to 5 seconds
Remote control input	0 to +10 volts input for full control range. Internally strappable for 0 to +5 volts. Voltage available at front panel connector for driving remote control potentiometer.
Size	19" wide, 3-1/2" high, 10" deep.
Weight	Aproximately 10 pounds.
Power requirement	115 V A C, 60 Hz, 10 watts nominal.

## GENERAL DESCRIPTION

The Eventide Clock Works Instant Phaser was designed specifically to eliminate the costly and tedious job of setting up and implementing the special effect known as "phasing" or "flanging". In addition to creating this effect, one can electronically control it to produce new and desirable effects.



Due to its unique electronic phasing network, one can use either an envelope follower, an oscillator, or remote control to vary the phasing effect. The unit is also compatible in control voltage requirements with most of the electronic synthesizers currently produced. The unit contains its own power supply to eliminate costly battery replacement, and is mounted in a heavy duty aluminum case with 19 inch rack panel for durability in a permanent installation or portable application.

## CONTROL DESCRIPTION

**In/Out Key:** In the IN position, signal is processed by the phaser, in the OUT position, the signal is bypassed from the input to both outputs.

**Depth control:** Controls the mix of direct and phased signal. When fully clockwise, both signals are of equal amplitude; when fully counter-clockwise, only the phased signal is present.

**Remote Input:** Connects to optional remote control voltage or resistance source. See Interface Connection sheet for hookup instructions.

**Oscillator Control:** Controls frequency of phasing oscillator from 0 to about 10 Hz.

**Δ Control:** Manual phasing control. Lamp over control indicates relative amount of phasing in manual and automatic modes.

**Envelope Follower Controls:** Threshold; determines input signal level necessary to activate envelope follower. Release; determines decay time of phasing after peak is passed.

**Function:** Determines which mode of operation is being employed. Illuminates lamp under the appropriate control or Remote jack. Lamp above control becomes illuminated when power is applied to the unit.

**Power switch:** Self-explanatory

## THEORY OF OPERATION

Classical "phasing" or "flanging" is produced by mixing the outputs of two tape recorders, whose signals are slightly differentiated in time (since they are operating at slightly different speeds). Let us examine the effect this has on the mixed signal which is being produced.

Assume there is a differential delay of 500 microseconds between the two signals. A delay of 500 microseconds means that a signal whose half-wavelength is 500 us (i. e., 1 KHz) will be out of phase on the two tapes, thus producing no output at that frequency. However, a signal whose full wavelength is 500 us (i. e., 2 KHz) will be added in phase, and its amplitude will be doubled. This effect continues as the frequency increases. Where the signal half-wavelength (plus an integral number of full wavelengths) is equal to the delay, there will be cancellation, where a multiple of the signal full-wavelength is equal to the delay, there will be addition.

As can be seen, the output of the two tape machines has a frequency spectrum which looks like a wave, alternately increasing and decreasing. Another characterization is that of the teeth of a comb, and indeed, this type of processing has been dubbed the "comb filter".

The effect of "phasing" is nothing more than subjecting a complex signal to this form of processing, and shifting the delay so that at any given frequency there will be a succession of nulls and peaks.

To produce the phasing effect without tape machines an alternate method is employed, since it is prohibitively expensive to generate delays up to the approximately 5 milliseconds required. This method is to use a succession of phase shift networks, which are voltage controllable, and which track each other in phase shift. For each pair of networks, roughly one frequency null and one peak can be obtained. Since the phase shift, and thus the frequency of null is controllable, the nulls and peaks can be moved up and down in frequency in a manner similar to that achieved by varying the time delay.

The quality of the phasing is dependent upon the number and constants of these networks, and how well they track. The larger the number of networks, the more convincing the effect and the higher the cost. Also, a point of diminishing returns is reached, where finally adding another network or so will have no audible effect. Extensive experimentation has established the constants and number of networks, and the Eventide Clock Works Instant Phaser has been designed to these criteria.

Besides normal phasing, certain new and interesting effects can be achieved with the INSTANT PHASER. Among them are:

#### STEREO OUTPUT:

The proprietary design of the phasing network allows one to obtain two outputs from one input. When the phasing is varied, and the outputs are split left and right, one perceives the feeling of motion due to the fact that when a specific frequency is "in phase" it appears in the center, and as it goes out of phase, it appears to move from side to side. Note that when the stereo output is mixed to mono either in the studio or by a mono play-back system, the phasing effect is still present.

The phaser can thus be used to generate a "pseudo stereo" by setting the phasing control at a fixed position. This does not separate instruments as in normal stereo, but the effect is interesting and pleasant.

#### DOPPLER SHIFT:

We are all familiar with the phenomenon of an auto horn apparently changing pitch as its relative speed with respect to the listener varies. This effect can be simulated with your instant phaser. To do this, turn the depth control fully CCW (unit may be connected either in stereo or mono). Vary the phasing quickly with the manual control, or set the oscillator control between 12 and 3 O'clock / You will now get an effect akin to a 45 rpm record improperly centered on the turntable.

#### ENVELOPE FOLLOWER:

One of the finer characteristics of the phaser is that the input signal itself can be used to control the phasing. By setting the envelope follower control so that peaks such as cymbal crashes activate the phasing (as evidenced by illumination of the lamp over the ~~Δ~~ control), and setting release time at a suitable value, a completely automatic phasing is achieved, freeing the engineer from hovering over the tape machines or phasing control, and producing a more consistent effect. Experimentation is necessary to determine the best control settings; we recommend setting the release control at about 3 o'clock for the most program material. The threshold control will vary depending upon the input level.

#### OSCILLATOR:

The oscillator can be used at slow speeds to recreate the "fading" effect of short wave transmission, and at high speed to produce vibrato type effects, as well as "doppler shift". The oscillator rate may be visually determined by observing the lamp over the ~~Δ~~ control.

#### REMOTE CONTROL:

This feature enables one not only to remote the manual phasing control, but to change its configuration so that the phaser may be operated by a joy stick, photocell, foot pedal, touch strip, or any other variable resistance. It will also accept an input voltage from a synthesizer or other source.

# THE INSTANT PHASER

Over 1200 degrees of phase shift  
Built-in variable frequency oscillator  
Internal envelope follower  
Remote control capability  
Stereo output  
Synthesizers  
Automatic-manual operation

Units used by Yes, the Grateful Dead, Chicago, Led Zeppelin, Todd Rundgren, Hot Tuna, The Edgar Winter Group, and over 100 major Studios, including CBS Recording Studios, EMI, Media Sound, The Record Plant, and Electric Lady.

To accomplish a phasing effect in the past, it was necessary to resort to a clumsy operation requiring two tape recorders, a variable-speed oscillator, a number of patch cords, and a means for setting the signal back into sync with the rest of the track. Now, Eventide has produced an electronic phaser which accomplishes all the desired results in real time with only two patch cords. In addition, this phaser can, by means of a built-in oscillator, control the period of the phasing automatically; and, by using the built-in envelope follower, phasing can be controlled by the amplitude of the incoming signal.

Another plus — the Eventide Instant Phaser is equipped to interface various remote control such as a foot pedal or joy stick. It can also be driven by most of the electronic synthesizers currently available. An output is provided to give a stereo phasing effect from a mono signal; and full stereo phasing can be effected by interlocking two units.

## SPECIFICATIONS

Frequency response	20Hz to 15 KHz, + 1db, -0db. (phasing out)
Distortion	Less than 1%
Phase shift	Greater than 1200 degrees at 1KHz.
Input	Nominal 10K ohm bridging.
System gain	Unity gain when driving 600 ohm line to +18 dbm.
Power requirement	115 VAC, 50-60 Hz, 20 watts nominal

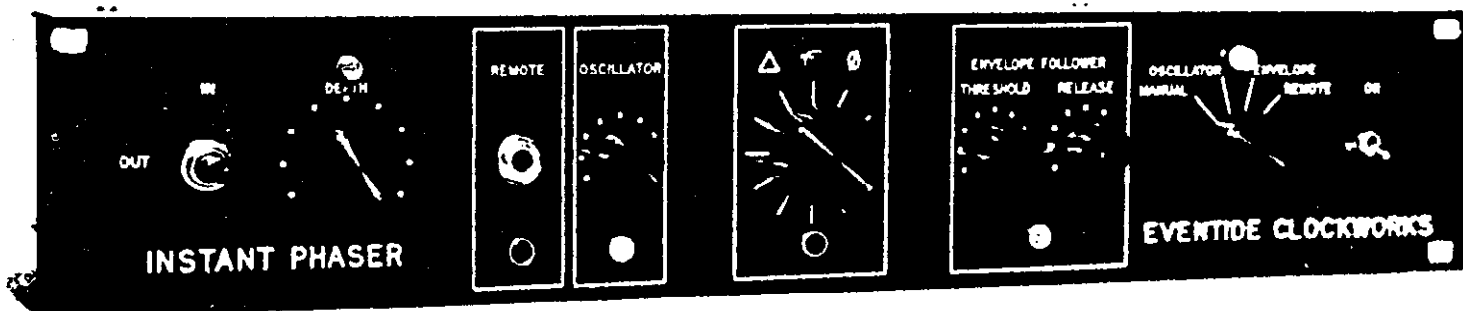
## Control Functions

— Manual Phasing — Oscillator Frequency — Envelope Follower Threshold — Envelope Follower Release Time — Phasing Depth — IN-OUT Key — Function Select (Manual, Oscillator, Envelope Follower, and Remote) — AC Power ON-OFF —

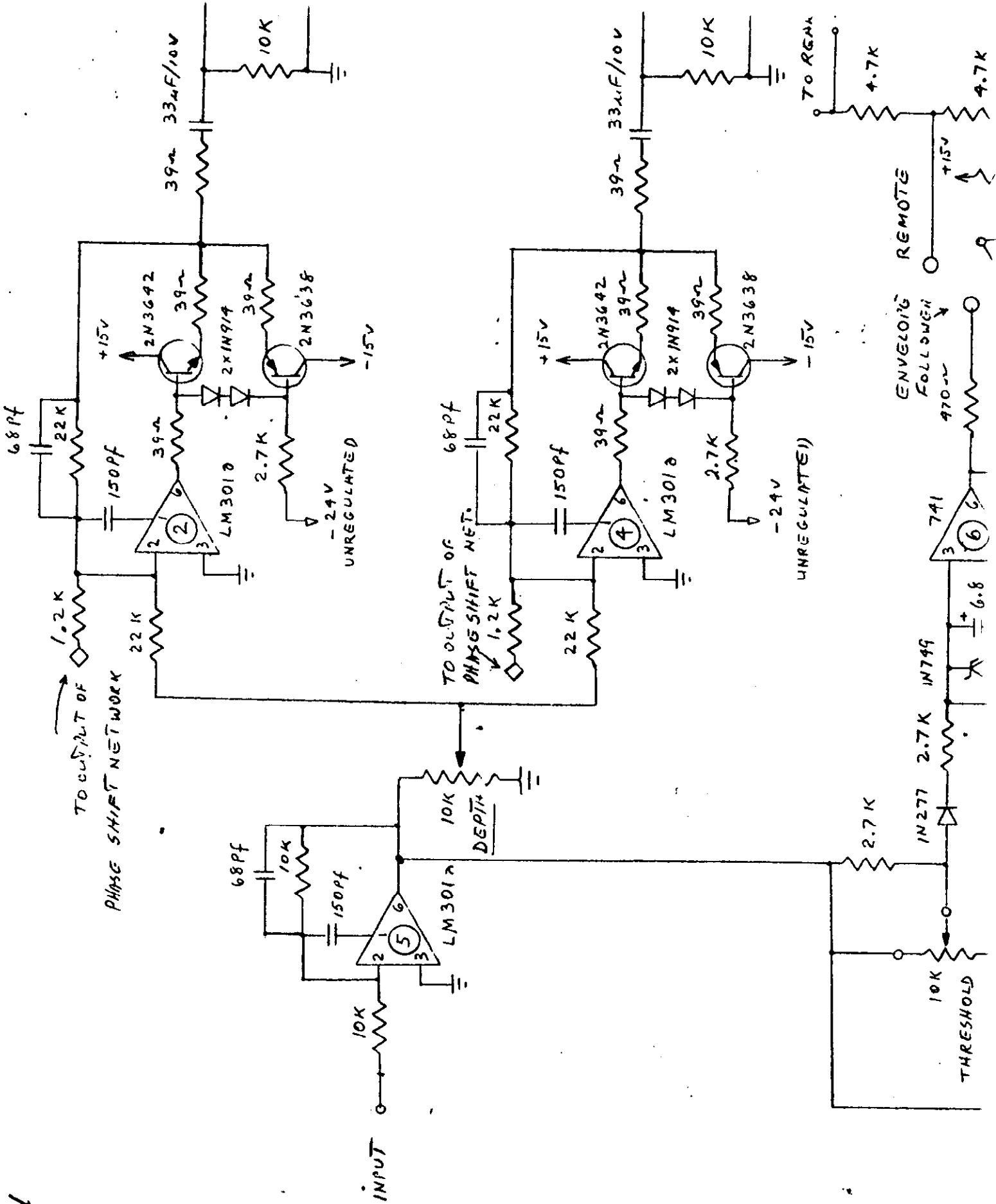
## Physical

Requires standard 19-inch rack mount, 3-1/2 inches high by 10 inches deep.

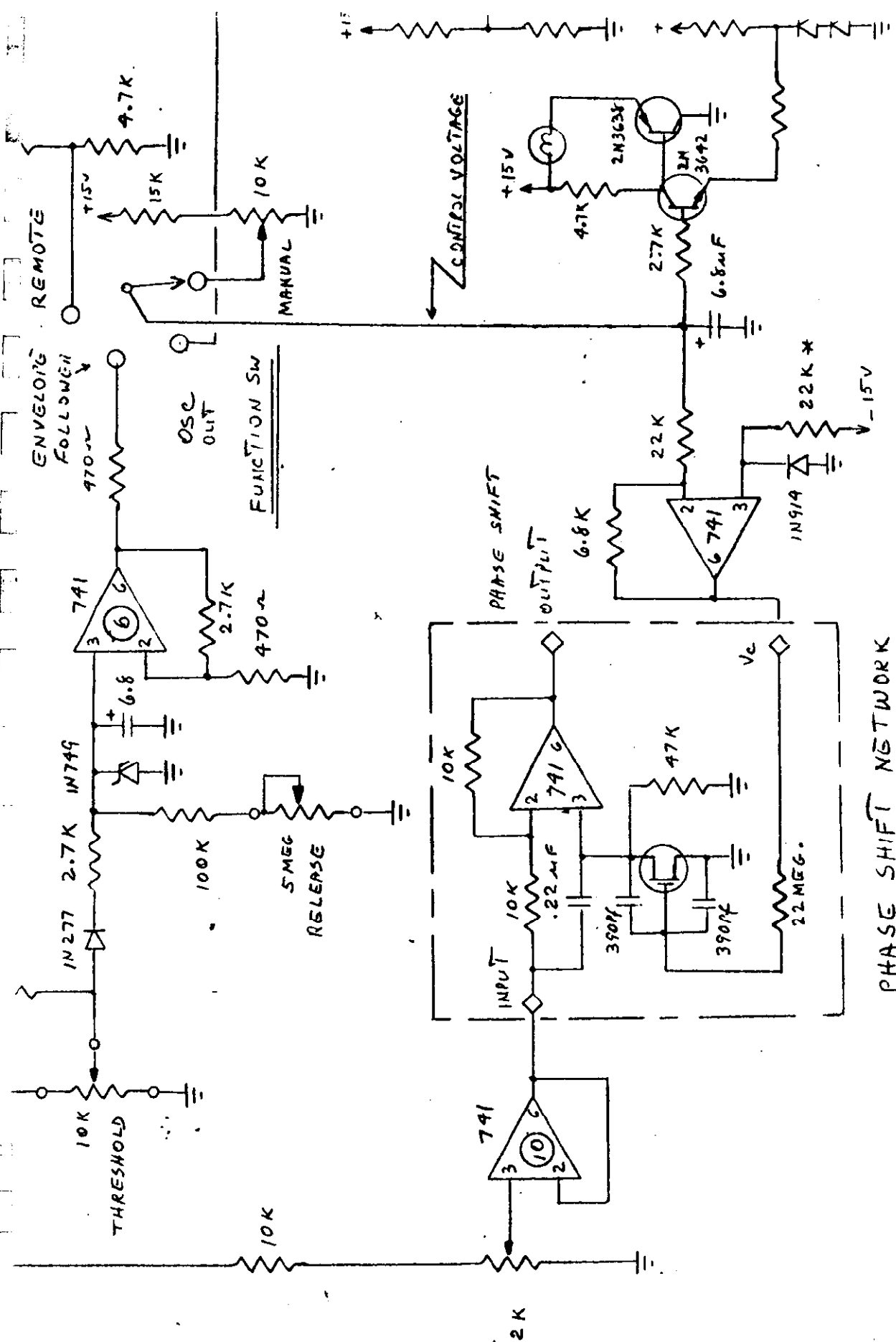
Available as an option is an internal preamp which accommodates the Instant Phaser to low-level instrument inputs, such as electric guitars & pianos.



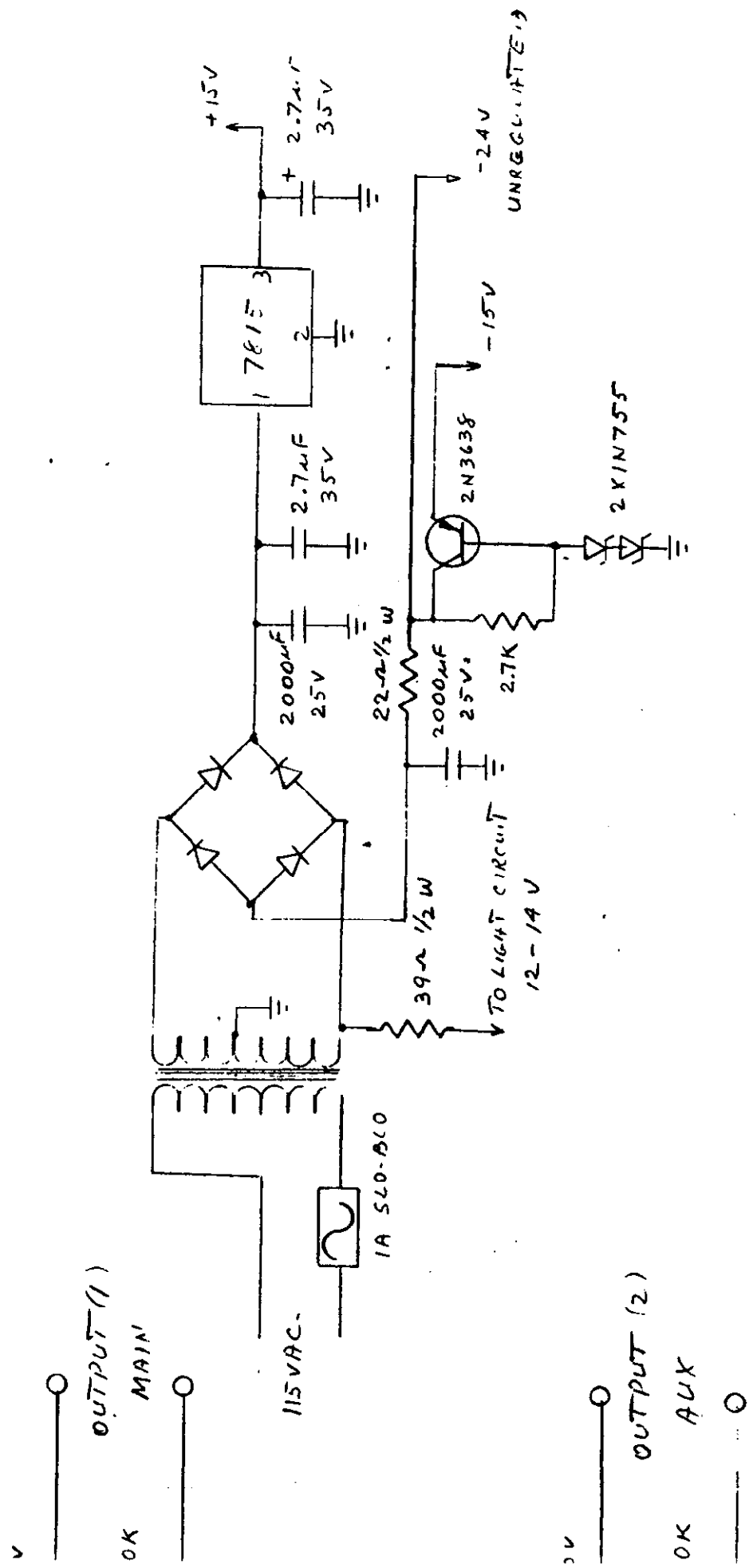
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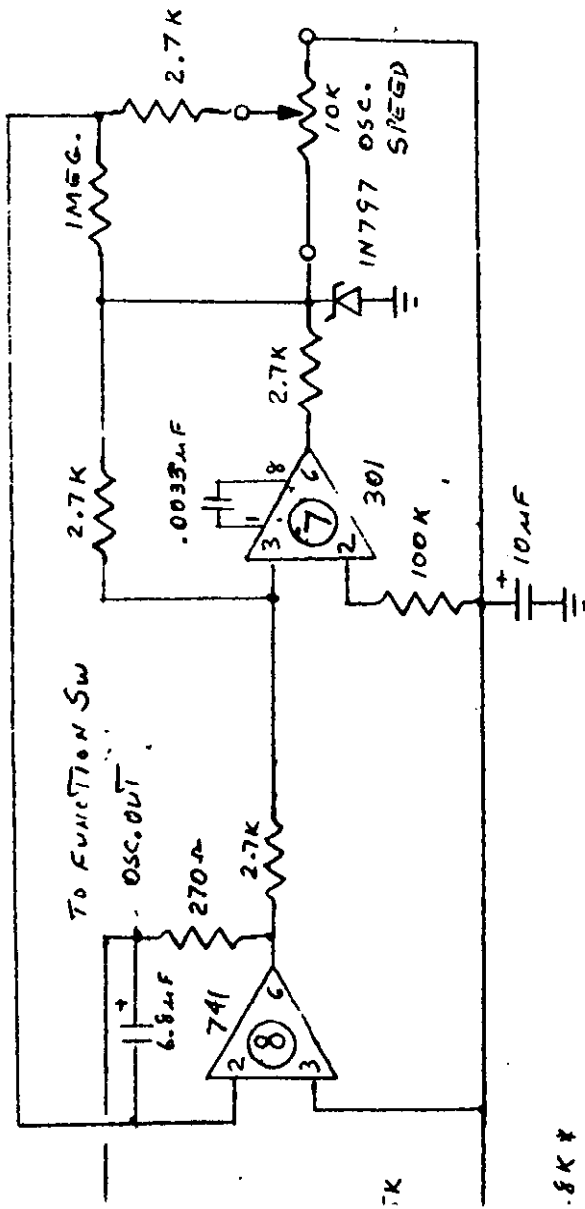


PHASE SHIFT NETWORK  
 (THERE ARE EIGHT IDENTICAL SECTIONS)  
 INPUTS + OUTPUTS ARE CONNECTED IN SERIES  
 V<sub>c</sub>'S ARE CONNECTED IN PARALLEL



OK PANG TERMINAL  
 TO FRONT PANEL JACK

X-CAPACITORS  
 VALUE TO BE RECALCULATED  
 WITH STANDARD TYPICAL VALUES  
 RESISTORS



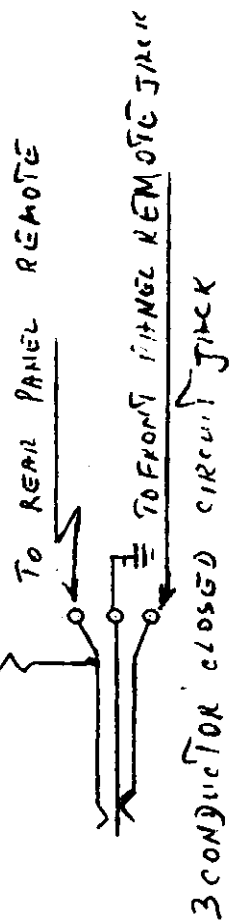
7K

15V

1V

1.7K

2x1N914



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 MODEL PS 101