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Technical Document Distribution

Brand:	**Mu-Tron**
Model	**MU-01 Phasor II**
Product:	**Pedal**
Description:	**Service Manual**

Musicparts Document Number: 45245 TechTips: No Pages: 10 Dated: 1979

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MU-TRON PHASOR II

INTRODUCTION

Congratulations on your purchase of the Mu-tron Phasor II. Your new Phasor II follows the original Mu-tron Phasor in providing true state-of-the-art performance in a compact and rugged package for the working musician. The Mu-tron Phasor II uses the advanced electronic technology developed for the revolutionary Mu-tron Bi-Phase, which gives the Phasor II unequalled performance in terms of dynamic range, freedom from overload distortion, low noise, wide sweep range, and intensity and range of effect. In addition, the Mu-tron Phasor II has three, continuously-variable controls for Rate, Depth, and Feedback to give the musician complete, precise control over the wide range of effects possible.

HOW DOES IT WORK?

Every musical signal consists of a number of different spectral components known as harmonics or overtones. Mu-tron Phasor II uses a six-stage variable phase-delay circuit to generate a phase-delayed signal.

This phase-delayed signal is electronically re-combined with a non-delayed signal, producing a series of cancellations and reinforcements in the overall frequency response, similar to a so-called comb filter.

As the amount of phase delay is varied, the cancellations move up and down the audio spectrum, subtly altering the harmonic structure of the original signal and thus producing the swirling, "spacey" sound known as phasing.

By adding electronic feedback to the phase-delay circuit, strong, sharp reinforcements are created in between the cancellations. These strengthened reinforcements heighten the contrast between cancellation and reinforcement, and serve to emphasize the sweeping effect.

CONTROLS

The POWER switch controls the AC power to the unit. When the unit is connected to a source of AC power and the top of the switch is depressed, the unit will be switched on and the LED indicator along side the switch will be illuminated.

The RATE control varies the rate of sweep of the phasing effect from a slowest sweep rate of 10 seconds per complete sweep cycle to a fastest sweep of 18 sweep cycles per second.

The DEPTH control adjusts the depth of the phasing effect by varying the width of the sweep range. As this control is turned up, the phasing effect will sweep over a wider and wider range of frequencies, producing a deeper effect.

The FEEDBACK control is unique to this model and its big brother, the Mu-tron Bi-Phase. By adding electronic feedback to the phase-shift circuitry, the Mu-tron Phasor II produces a pronounced sweeping sound which adds tremendous emphasis and intensity to the basic phasing effect, particularly at very slow sweep rates.

The BY-PASS FOOT SWITCH (unlabeled), located on the sloping front section of the Phasor II, switches the phasing effect on or off without affecting the loudness or tone quality of the signal. In the by-pass mode the Phasor II impedance-compensates the input signal to 600 ohms without changing the signal level or frequency response. This allows the use of long cables between the output of the Phasor II and the input of the amplifier without the signal loss, treble loss, or hum pick-up normally associated with long cables.

OPERATING INSTRUCTIONS

Connect the line cord of the Mu-tron Phasor II to a source of 117V AC power and turn on the Power switch so that the LED indicator lights up. Connect the output of your instrument (or the output of another sound modifier, such as a fuzz-tone or a Mu-tron III) to the "INST" input on the back of the Phasor II, and connect the "AMP" output of the Phasor II to the input of your amplifier

(or other signal processor, such as an equalizer or echo).

Experiment with various settings of the Rate, Depth, and Feedback controls. Start with the following setting for a conventional phasor sound:

"Normal" Phasing: Rate: 1 to 5 Depth: 8 Feedback: 0

Then gradually turn up the Feedback control and adjust the Rate and Depth controls until you get the following setting:

"Super Sweep" Phasing: Rate: 1 to 2 Depth: 10 Feedback: 10

Now experiment with other rates and other combinations of the three settings, but remember these hints:

1. Feedback is most effective at slower sweep rates.
2. As the Rate is increased, the Depth should usually be decreased to prevent the effect from sounding choppy.
3. If you begin to hear distortion on certain notes as the Phasor sweeps past, turn the Feedback down slightly.

SPECIFICATIONS

Input Impedance: 390K ohms, unbalanced.
Output Impedance: 600 ohms, unbalanced.
Gain: Unity (less than 1db insertion loss).
Frequency Response (Bypass): 20Hz—20KHz ± 2db.
Signal Handling Capability:
Minimum Feedback: 4V RMS, 11.2V Peak-to-Peak.
Maximum Feedback: 2V RMS, 5.6V Peak-to-Peak.
Signal-to-Noise Ratio: Better than 86db below 2V input.
Phasing Rate: 0.1Hz to 18Hz, continuously variable.
AC Power Requirements: 117V AC, 60Hz, 5W.
Warranty: 1 year limited warranty on parts and labor.

WARNING

TO PREVENT FIRE OR SHOCK HAZARD,
DO NOT EXPOSE THIS APPLIANCE
TO RAIN OR MOISTURE.

MU-TRON

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Lexington, Massachusetts, 02173
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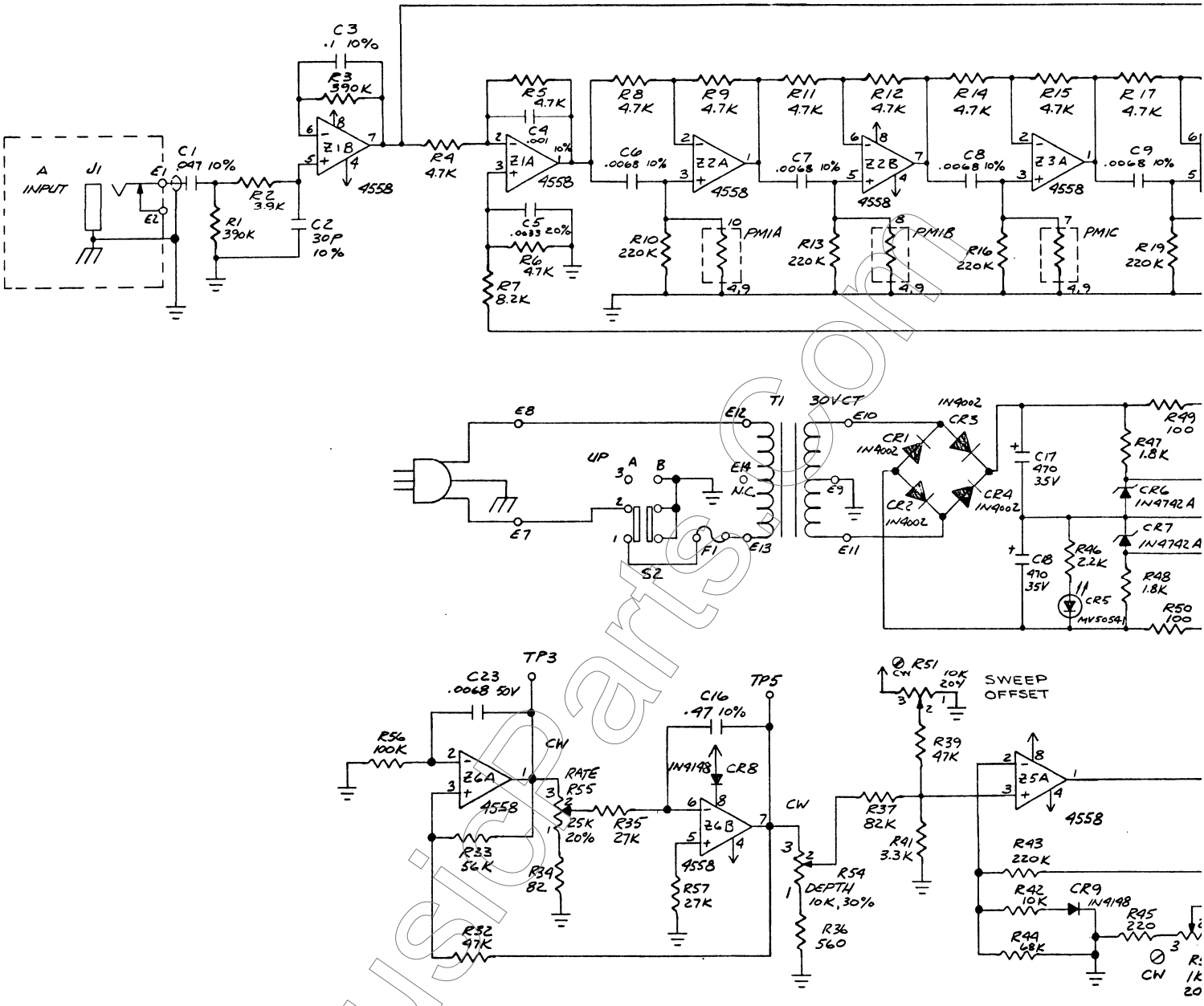
Musitronics PHASOR II Parts List (No references given)

ARP PART NUMBER	ARP/MFG PART NUMBER	DESCRIPTION
1200301	1N4148	Diode, Signal
1202101	1N4002	Rectifier, 100V
1201901	1N4742A	Diode, Zener, 12V
1202001	MV5054-1	Diode, Light Emitting, Red
1305701	2N4401	Transistor, NPN
1302801	2N6076	Transistor, PNP
1301701	2N5172	Transistor, NPN
1700901	312.250	Fuse, 3AG, 1/4A
1903601	RSW-422-SA-P-R1-BK-SG-CE	Rocker Switch, Red, DPDT
1903701	112-P	Push Switch, SPDT
5602701	RC4558PL	IC, Dual Op Amp, Selected
5707171		Rotary Pot, 10K
5707201		Rotary Pot, 25K
5707301		Power Transformer, 117VAC
5707001		Knobs, gray

Phaser 2 calibration procedures

I. Set-up.
- A. Adjust sweep generator for 20-20kHz., 50 mv. peak-to-peak output. Connect to phasor input.
- B. Set channel "A" of scope to .1V/cm sensitivity. Connect to phasor output.
  1. Set scope time base for 2 sec/cm, and adjust vernier for full graticule sweep display.
- C. Set channel "B" of scope to 1V/cm sensitivity. Connect to the emitter of drive transistor (near photomod).
- D. Connect AC power to unit, using zip cord with alligator clips.
  1. One side to fuse clip.
  2. Remaining side to transformer primary on PCB.
- E. Turn all controls full clockwise.
- F. Power up unit. (LED should be lit)

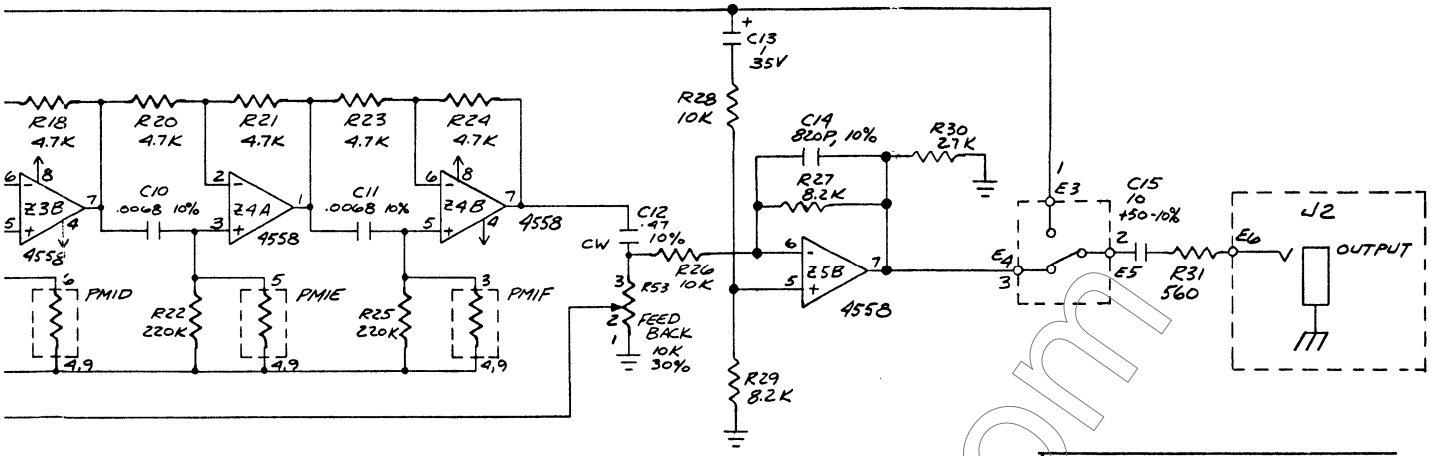
II. Test and calibration.
- A. With scope channel "B" set to be triggered by input-----adjust low end sweep (10K) trimpot (TP1)-----just above distortion or "glitch" point.
  1. Check top of waveform for flat spot.(If it is present, change R37 from 68K to 82K ohms) Turn off channel "B".
- B. With scope channel "A" set to be triggered by sweep generator, adjust high end response.
  1. While turning feedback control counterclockwise, examine the waveform carefully.
  2. Turn rate control counter-clockwise, making sure control taper is linear and effective at reducing oscillator speed.
  3. It is important that the depth control, be left turned up full.
  4. Adjust high end (1K) trimpot (TP2)(near drive transistor) for a maximum sweep range----- the last notch falling approximately 4mm from the right side of the graticule. (Depending on scope and generator calibration).
  5. At this point the depth control should be used, to see if it is effective.
- C. Recheck all switch and control functions.
- D. Secure trimpots with nail polish or other suitable paint, and place your sticker on the unit.

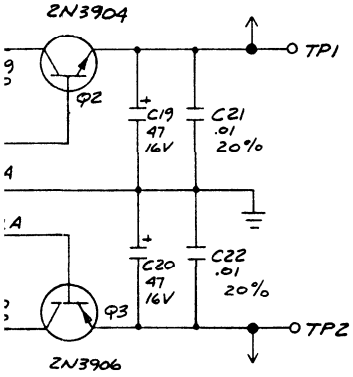


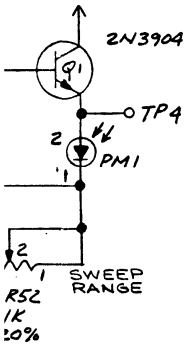
NOTES:
1. UNLESS OTHERWISE SPECIFIED
   RESISTOR VALUES ARE IN OHMS, ¼W, 5%
   CAPACITOR VALUES ARE IN µF (P=PICOFARADS)
2. CONVENTION USED FOR SUPPLY VOLTAGE CONNECTIONS

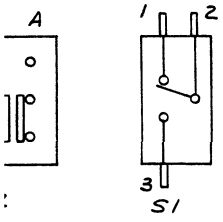
↑ IMPLIES +12V	↑
↓ IMPLIES -12V	↓

3. HIGHEST REF DES: Z6, R57, CR9, C23, E14, Q3, S2, J2, T1, TP5, PM1







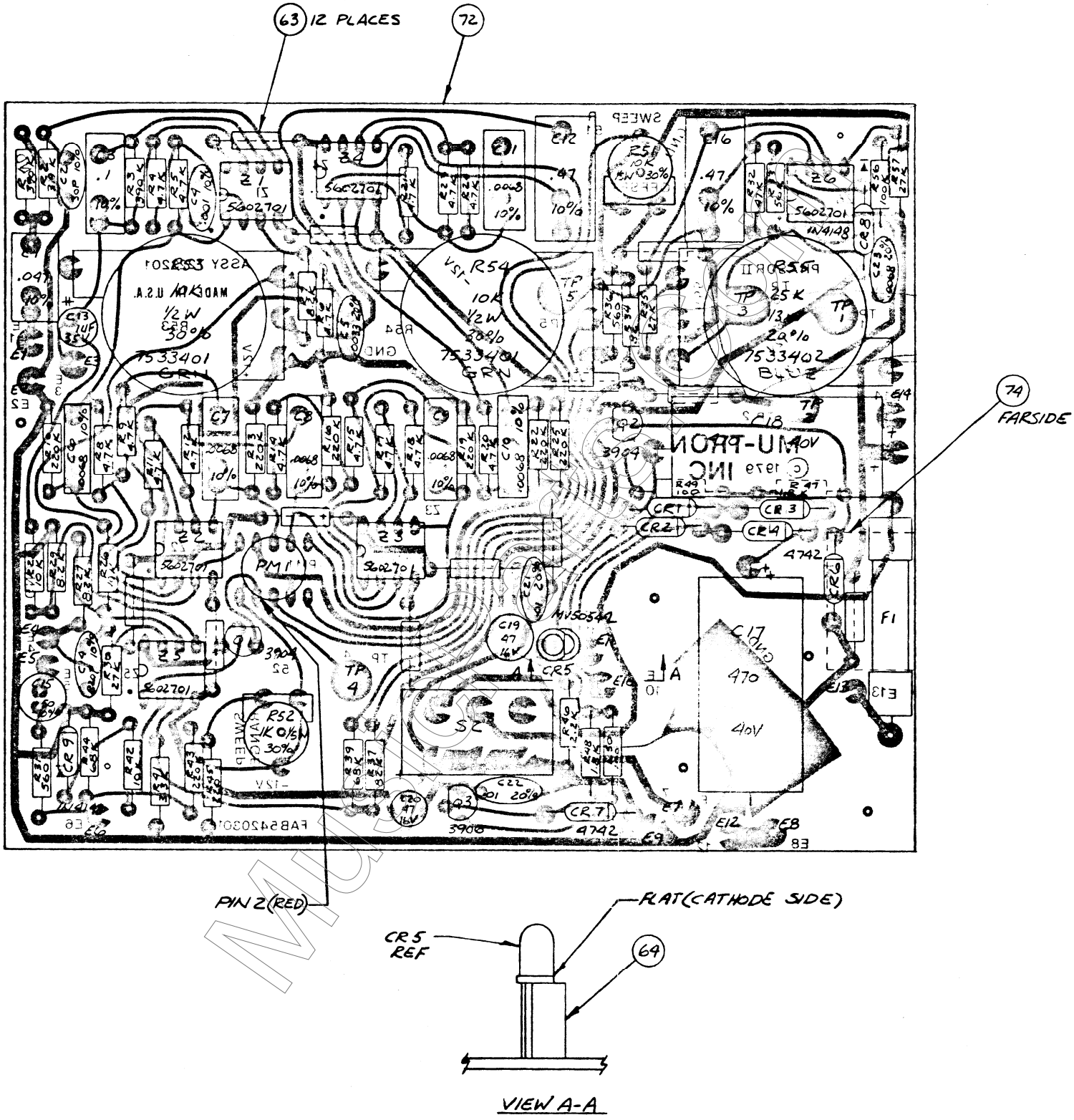


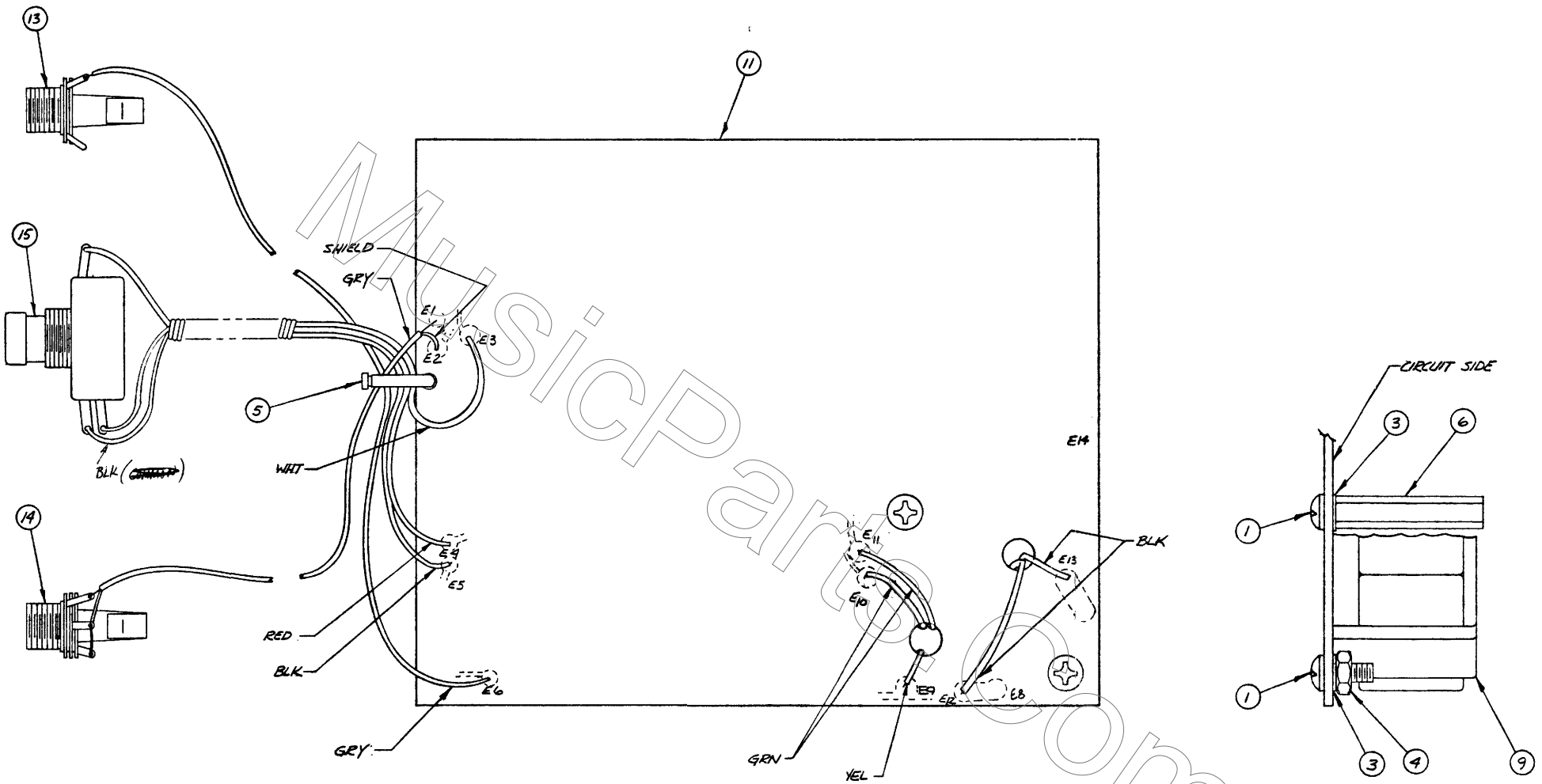
REVISIONS		
LTR	DESCRIPTION	DATE
A	PROD REL 397	2.28.79

MusicParts.Com TechNote:

Mu-Tron /Arp
MU-01 Phaser II Pedal

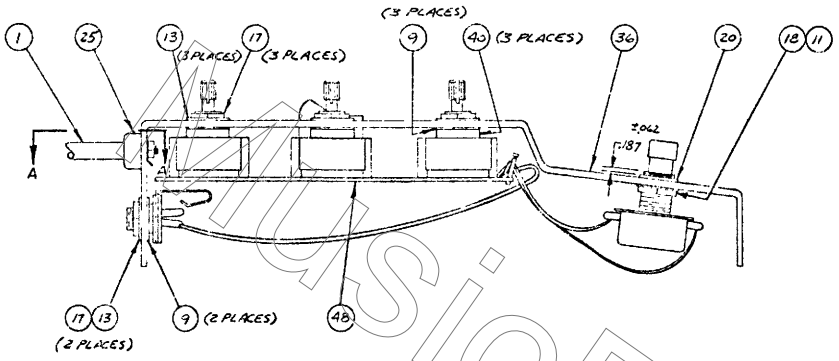
ARP PART NO	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		MU-01	
USED ON PL 7223201	TOLERANCES XX ± .02, XXX ± .010, ANGLES ± 1°		TITLE	SCHEMATIC PC BOARD PHASOR II
MATERIAL	REMOVE BURRS & SHARP EDGES DO NOT SCALE DRAWING			
	DRAWN DLJ	2-1-79		
FINISH	CHECKED DBL	2.5.79	SYM SWD	SIZE D
	APPROVED JJL	2/12/79	DRAWING NO 77209	
	APPROVED	2-22-79	SCALE	SHEET 1

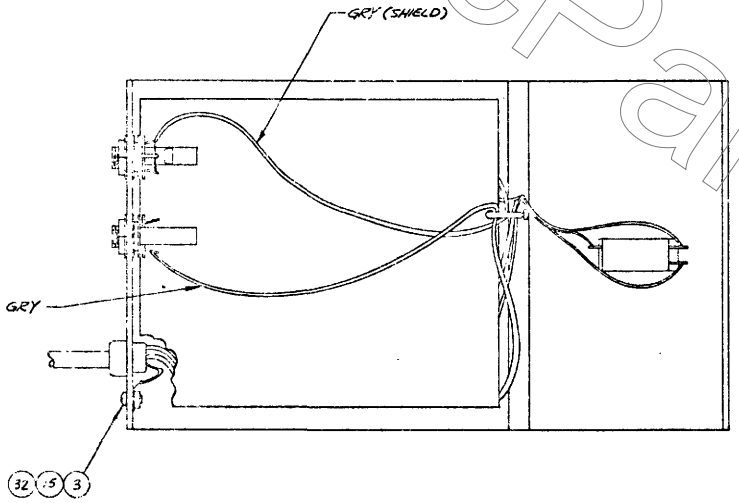

63 12 PLACES
72
74
FARSIDE
PIN 2 (RED)
FLAT (CATHODE SIDE)
CR5
REF
64
VIEW A-A

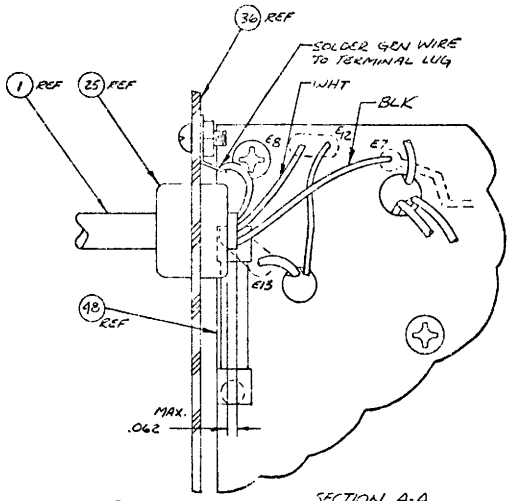


ARP PART NO.	DESCRIPTION	USED ON
7534901	220V STD.	PL 7535201
7534903	120V CSA, LA	PL 7535203

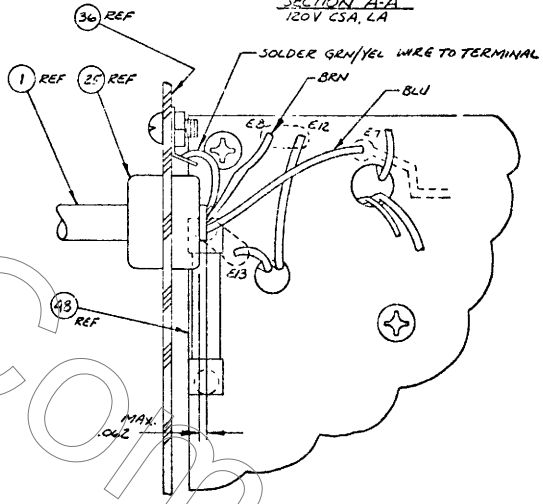
NOTES:
1. FOR LIST OF PARTS, SEE TABULATION.







SECTION A-A
120V CSA, LA



SECTION A-A
220V. STD

NOTE:
1. FOR PARTS LIST, SEE TABULATION.