INSTRUCTION MANUAL

MODEL SCG-3T

STEREOPHONIC GENERATOR

MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESEARCH PARK
GOLETA, CALIFORNIA 93017

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111 Castilian Drive
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I. INTRODUCTION

The Moseley Associates, Inc., Model SCG-3T Stereo Generator is intended specifically to provide the broadcaster with a high-quality stereophonic composite signal. Intended primarily to drive the Model PCL-303/C Studio-Transmitter Link, it may also be used with most other FM exciters using direct frequency modulation. Because the radiated signal quality is dependent on several factors, including antenna, transmission line, the FM transmitter itself, and any audio processing equipment, the SCG-3T has been designed to greatly exceed the system requirements in every respect. Considerable degradation may occur in other portions of the system before performance fails to come up to FCC standards as set forth in Section 73.322 of the Rules.

Aside from superior electronic operation, the SCG-3T also features built-in metering of the audio and output signals, small size, rugged construction, and pushbutton mono-stereo selection which can be remotely controlled. The electronic assemblies are broken into two parts, each sliding out of the main frame for adjustment or maintenance. On the right is the power supply section, and on the left is the larger stereo electronics section. Each is connected to the main frame with an umbilical cable which can be disconnected easily in case that section must be removed entirely from the main frame.

II. SPECIFICATIONS

Input Impedance	600Ω, balanced, floating
Input Level	+10 dBm ±2 dB
Input Program Filters	Better than 50 dB down at 18.5 kHz and above
Frequency Response	±1 dB, 30 Hz to 15 kHz
Pre-emphasis	75 μsecond standard, field convertible to other values including flat
Harmonic Distortion	Less than 0.4% stereo or mono
Noise Level	Better than 68 dB below normal output
Output Level	3.5 volts peak-to-peak, 5 volts maximum
Minimum Load Resistance	5000Ω
Maximum Load Capacitance	1000 picofarads
Pilot Carrier Stability	Less than 1 Hz drift in 6 months
Channel Separation, LEFT and RIGHT	35 dB minimum, 45 dB typical
Cross talk, Main and Subchannels	43 dB minimum, 50 dB typical including the built-in 17 kHz low-pass program filters
Subcarrier Suppression	48 dB minimum, 55 dB typical, with or without modulation
Spurious Outputs Above 55 kHz	Better than 60 dB below normal output
Stereo-Mono Switching	Front Panel illuminated pushbutton or remote momentary contact closure to ground; modulation level is the same in stereo and mono modes.
Metering	Peak-reading meter calibrated in dB, switchable to read LEFT, RIGHT or TOTAL OUTPUT.
Power Requirements	120/240 volts AC, 50-60 Hz, 10 watts
Operating Temperature Range	30 to 140°F
Weight	20.5 pounds
Size	3½"H, 19"W, 11"D
Domestic Shipping Weight	27 pounds

III. INSTALLATION

The SCG-3T should be mounted somewhere between waist and eye height. This will enable convenient local pushbutton operation as well as selection and reading of the meter. The rack should be grounded.

Prior to application of the primary power (117 volts AC, 50-60 Hz), be sure that all transistors are in their sockets and that there is no obvious physical damage to the device.

At this time, the left and right audio lines can be connected, as well as the remote control line. Each of these three lines can use the same type of cable, a typical type having two conductors with a common outside shielded jacket. In each case, the shield is at ground potential. The output line should be fitted with a type BNC connector and should employ not more than 20 feet of coaxial cable.

The left and right audio lines should be driven from a frequency-sensitive audio processing device, several of which are available on the market. The remote control lines for selecting stereo or monaural operation should be connected to a pair of pushbuttons, single-pole, single-throw normally open. Each button returns to ground. If a two conductor plus shield can be used as the ground connection. These remote buttons can be used to switch from the stereo mode to mono and back again. In the mono mode only one audio channel is used. This has been selected in accordance with industry standards as the left channel. Should the left program-source channel fail, routing the input to the SCG-3T through a patch panel will facilitate reverting to the other audio source and monaural operation. The remote control contacts parallel the switch elements in the front panel pushbutton assemblies and only a momentary contact is required to switch from one mode to another.

The required audio input level will be in the vicinity of +8 dBm to +12 dBm. The front panel dB meter may be relied on to indicate the exact level, regardless of whether sine wave test signals or actual program material is used.

The output level is normally 3.5 volts peak-to-peak, regardless of whether stereo or mono signals are transmitted. The output will normally go to the wide-band input on the PCL-303/C Transmitter. The length of the interconnecting cable should not exceed about 20 feet.

With power and audio signals applied, the operation of the meter, meter switch, and pushbuttons can be observed. In addition, if the remote switching is connected, the operation of this too can be confirmed.

IV. PRINCIPLES OF OPERATION

Very simply stated, stereophonic transmission is the electronic switching at a supersonic (38 kHz) rate of the output, first to the left audio channel and then to the right audio channel. This takes place repetitively at a rate that is so fast it is inaudible; the person with a monaural receiver hears only the resultant blend between the two channels. The listener with a stereo receiver has the ability to decode the stereo signal so that he recreates the original left and right channels. It has been determined in practice that this scheme is compatible with other services such as simultaneous background music transmission.

In addition to switching the output signal alternately between the left and right audio channels, a pilot tone signal is also transmitted to enable the receiver to synthesize a switching signal to decode or demodulate the stereo signal into its left and right audio components. To prevent interference to this pilot tone (at 19 kHz), the SCG-3T has built-in low-pass filters cutting off at 17 kHz so that program material content above that frequency is sharply attenuated. In this manner, no particular signals will interfere with the pilot tone and the receiver can extract the 19 kHz signal with a minimum of effort.

As in standard monaural transmission a 75 μsecond pre-emphasis (treble boost) is employed in each input audio channel. After demodulation in the receiver, de-emphasis (treble cut) is employed to counter the transmitted signal with its pre-emphasis. The receiver de-emphasis cuts down the noise on the signal, as well as the level of the pilot tone and other by-products incidental to the receiver's demodulation process.

Details of some of the problems associated with stereophonic transmission will be touched upon later in this manual.

The basic parts required for stereophonic signal generation are now seen to be these:

1. A pair of identical audio channels incorporating pre-emphasis.

2. A pair of 17 kHz low-pass filters, one in each channel.

3. An electronic switch that alternately keys first the left and then the right channel to the output circuitry.

4. A relay to select either the signal from the electronic or one of the audio channels to the output amplifier.

5. A metering system

6. A power supply

V. DETAILED CIRCUIT DESCRIPTION

The following description is with reference to the block diagram shown in drawing number 92A-1004.

Discussing first the switching-signal generation process, observe the 76 kHz crystal-controlled oscillator using IC-301 in the upper left corner of the block diagram. This oscillator is followed by a buffer, Q-301, and is then divided down to 38 kHz with the integrated circuit binary divider IC-302. The output of the divider is applied to IC-303, where a push-pull 38 kHz switching signal is developed. This 38 kHz signal is used to operate the diode switch using CR-303, CR-304, CR-305, and CR-306. The diode switch alternately commutates the left and right audio channels to the following buffer.

The output of the binary divider is divided again in another section of IC-302 to develop a 19 kHz square wave. This is applied to a buffer and is then sinusoidalized with a low-pass filter using L-301. This sine wave becomes the pilot tone and is mixed with the buffered output of the diode switch.

At the left of the block diagram is shown the pair of audio inputs. These are applied to resistive pads to properly terminate the driving amplifiers, usually a limiter or clipper. Following the pads are transformers for conversion from balanced floating connections to unbalanced connections suitable for application to the audio amplifiers.

The audio amplifiers are similar except that one channel has a set of three adjustments to enable its amplitude and phase response to coincide with the other. The left channel has fixed characteristics and the right channel has the variable controls for matching.

Discussing the left channel first, this amplifier has a very large amount of negative feedback applied to it. This reduces distortion and stabilizes the gain and other characteristics. More important, it allows the use of resistors and capacitors to achieve an accurate pre-emphasis characteristic. To increase the power handling ability of this amplifier, it is followed by a buffer, Q-307. It is of interest to note that this amplifier is entirely direct-coupled.

Following the buffered output of the audio amplifier, a low-pass filter has been installed. This filter is down about 0.6 dB at 15 kHz and down 55 dB at 18.5 kHz and above. This insures that the stereo receiver will see no interfering program components which may conflict with the 19 kHz pilot.

The output of the low-pass filter is applied to another buffer, Q-308, which terminates the filter and drives the metering amplifier as well as the mono gain control. Note that the SCG-3T, in the mono mode, uses the left channel as its source.

The audio is then applied to one input of the diode switch via another buffer, Q-309. This buffer is needed due to the requirement for low-impedance drive to the diode switch audio inputs.

The right audio channel is electrically similar to the left except that there is no output for monaural operation. Pre-emphasis is adjustable to track with that of the left channel, as is channel gain. Filtering and buffering are identical with that in the left channel.

The pre-emphasis, including both phase and gain, must be made coincident with the left channel to satisfy FCC requirements. This comes about when the left and right channels are fed identical signals; under these conditions the difference signal must be suppressed more than 40 dB at any test frequency from 50 Hz to 15 kHz.

(In this discussion, occasional reference will be made to the "Main," "sum," or "L+R" signals. These are all one and the same. Likewise the "difference," "stereophonic subcarrier," "subchannel" and "L-R" signals are all one and the same.)

In a similar manner, if the left and right channels are fed from the same source but of opposite polarity, then the resultant main channel output from the stereo generator must be suppressed by the same amount, 40 dB. This can be accomplished only by accurately matching the two audio channels, including isolation transformers, low-pass filters and pre-emphasis networks, to within a tenth of a decibel and 1 degree phase error. Due to tight manufacturing tolerances and the set of three adjustments incorporated in the right channel of the SCG-3T, these conditions can be met with ease.

The diode switch, driven from the push-pull 38 kHz square-wave switching signal, delivers an output which may be termed square-wave stereo. The pilot tone is absent at this point. The diode switch also has a carrier balance control to enable an excellent rejection of residual 38 kHz signal, either in the presence or absence of audio.

The output of the diode switch is applied to a buffer, part of IC-306, and the output of this buffer is combined with the sinusoidal pilot from L-301. The combined signal is applied to a phase-linear low-pass filter to remove harmonics of the stereo signal. The result is a standard stereo signal with sine-wave switching. The filtering process yields an unwanted byproduct in the form of an excess of level of the 38 kHz difference output component. This is corrected by adding a small amount of the L+R signal with the aid of the SEPARATION control.

The output of the left audio amplifier or the output of the phase-linear low-pass filter is selected by the stereo-mono relay K-201. The output of the relay is then applied to the output buffer, IC-307.

Metering signals are derived from the audio amplifiers Q-305 and Q-308 for the right and left channels respectively. The total or composite output signal for metering purposes is derived from the output buffer IC-307.

The metering amplifier has sufficient gain and bandwidth to give a good indication not only with monaural operation but also with stereo operation. The output stage of this amplifier has the current handling ability to enable the peak detector to respond to very short pulses of signal, i.e., stereo waveforms. The amplifier deliveres its signal to the meter located on the power supply module. This meter is peak reading, and is calibrated in decibels rather than volume units (VU) because it responds not to the rms or average value of the waveform in question but rather to the peak instantaneous value. Complex waveforms, as encountered in typical music and speech waveforms are accurately indicated. This meter should not be used as a modulation monitor, but may be used as a valuable maintenance aid.

The power supply for the SCG-3T is conventional, with a split primary on the power transformer to enable rewiring in the field for 240 VAC operation. Operation on frequencies below 50 Hz should be avoided. The 40 volt output is used solely to operate the lamps and the relay; the 22 volt rectifier outputs are regulated down to 15 volts both positive and negative. Additionally, 10 volt regulators located at the stereo board are used for final regulation and hum reduction. This also offers protection against both transient voltages should the module be plugged in while power is on or should the 15 volt regulators fail.

VI. ADJUSTMENT

Operation of the SCG-3T should present few problems. The simplicity of installation, the elementary input and output connections, and the self-explanatory external labelling contribute to this. However, should the monitoring apparatus indicate that there is a problem in the system, and further should this trouble positively be traced to the SCG-3T, then readjustment may be in order.

Because of the fact that aging of components in solid-state equipment is greatly reduced compared to similar tube equipment, readjustment should be considered undesirable unless virtually proven necessary. Description of the various internal controls and their functions will enable the competent engineer to quickly correct minor discrepancies, possibly without loss of air time. Some tests require momentary removal of program, but in any event the unique packaging of the SCG-3T enables fast access to the circuitry from the front of the rack while maintaining a clean front panel appearance.

The location of the controls and test points is shown in Drawing SKA-6222. The labelling of these controls is, of necessity, abbreviated. The following information should clarify their functions.

> PILOT – Adjusts the level of the pilot tone. FCC requires that this level should be set to between 8% and 10% modulation.
>
> CARRIER BALANCE – This control enables the diode switch modulator to operate in a balanced condition such that there is a minimum amount of 38 kHz switching signal appearing in the output. Normal adjustment procedure is to remove modulation and adjust this control for a null when the stereo monitor is set to read the 38 kHz level.

SUB TO MAIN – This control affects the signal known as cross talk from the subchannel to the main channel. Feed both stereo channels with the same signal but of opposite polarity. Under these conditions, the signal in the main channel (or as heard on an ordinary monaural receiver) will be cancelled out. This control will enable the cross-talk cancellation.

SEPARATION – As its name implies, this control affects the separation between the left and right stereophonic channels. While feeding a signal into one channel, monitor the other stereo channel with the stereo monitor and adjust the SEPARATION control for maximum separation.

MONO GAIN – This control insures that when switching from the stereo to the mono mode of operation, the modulation percentage is equal. This control is adjusted to make the mono agree with the previously adjusted stereo signal level.

50 HZ GAIN – This control affects the gain of one of the audio channels at low frequencies only. It is necessary for the two channels to have identical gain at all frequencies in order to have minimum cross talk. Feeding both channels in phase with a low frequency, this control is adjusted to produce a minimum amount of signal in the subchannel.

5 KHZ GAIN – This control is similar to the above mentioned control but affects cross talk in the 5 kHz region only.

15 KHZ GAIN – This is the third and final control for cross-talk adjustment and affects cross talk in the 15 kHz region only.

FILTER TERM – This control is used to properly terminate the phase-linear low-pass filter. It is set for maximum separation between audio channels at a frequency of about 13 kHz.

Immediately behind the PILOT LEVEL control is a variable inductor. This inductor adjusts the pilot phase relative to the 38 kHz switching signal. While monitoring the 19 kHz level with the stereo monitor, this coil may be tuned for maximum level. Then it should be varied slightly in whatever direction enables best stereo separation.

About one inch behind Q-301, a small mica capacitor will be seen. This capacitor is used to adjust the pilot frequency. The oscillators have proven to be quite stable; they drift about 1 Hz low after about a year of operation and then should remain on-frequency thereafter. Hence, when the equipment is first received, and if the oscillator is somewhat high (perhaps 1 Hz), do not adjust the oscillator frequency. It will age to the target frequency representing a 19 kHz pilot tone within several months. The crystal is a low-temperature coefficient unit, with a zero temperature coefficient at room temperature. No other components significantly affect frequency.

At the right rear of the main stereo board will be noted the output buffer amplifier using IC-307. This is a direct coupled amplifier with a few external components for phase compensation and parasitic suppression. There may also be seen a few blank holes in this area. These are for the purpose of pre-distortion of the stereo signal should this be required in unusual circumstances.

VII. OPERATIONAL SUGGESTIONS

It may be of interest, in automated operations, to consider the use of auxiliary trip tones to switch automatically from stereo to monaural transmission. Selected items during the day, for example station identification, could be transmitted in stereo but using one channel only (the left channel). This will allow the use of your station for accurate receiver alignment.

When stereo signals are being transmitted, the entire frequency spectrum from 50 Hz (or below) through about 53 kHz is occupied. The only remaining spectrum for SCA operation is the band between 53 kHz and 75 kHz. An industry standard for SCA operation is at a center frequency of 67 kHz. This frequency, when modulated either excessively or with program signals above about 5 kHz, can still interfere with stereo programming. Hence, when SCA programming is attempted at 67 kHz, it is highly advisable to limit both the instantaneous excursion of the SCA subcarrier and to restrict the bandwidth of the program material. These two things, when done simultaneously, will normally prevent sideband interference to the stereo signal. Refer to the FCC Rules, Sec. 73.319 for technical standards concerning SCA operation.

Another form of interference between the SCA and the stereo signals which may occur in some systems is the splatter from the stereo signal into the SCA region. The design philosophy of the SCG-3T Stereo Generator is to use audio filters in each channel, cutting off the response at 17 kHz. This positively prevents sideband components in the stereo subchannel from being generated above 55 kHz in the first place. This completely cleans the spectrum above 55 kHz and the SCA receiver then has no interference with which to contend.

On occasion, there may be noted a whistle in the stereo receiver when SCA signals are being transmitted on 67 kHz along with the stereophonic programming. This whistle, at a frequency of 10 kHz, is generated in the stereo demodulator as a byproduct of the demodulation process. The 19 kHz pilot tone itself is "demodulated," and a large third harmonic component is developed. This 57 kHz signal, which is not transmitted but which is generated in the demodulator, is then mixed in the demodulator circuit in a non-linear manner with the 67 kHz SCA signal. The resultant 10 kHz intermodulation component is passed by the audio system and is heard as an annoying whistle. Depending on the individual receiver or monitor, it is generally about 55 to 65 dB below full modulation. The importnat thing to remember is that this whistle is probably developed in the stereo demodulator and is not being transmitted. This can be confirmed by noting that the modulation monitor baseband (wideband) output, as measured by a tuneable voltmeter, does not contain the 10 kHz signal.

Should there be an apparent problem in properly demodulating the output of the SCG-3T, bear in mind that the fault may not necessarily lie in the generator. Remember that stereo monitors essentially reverse the switching process used in the SCG-3T to generate the stereo signal. They process the composite stereo signal back into the original left and right audio channels. Most of the same techniques used in the SCG-3T are common in stereo monitors, and so it can be seen that the monitor can be easily adjusted to compensate for an incorrect condition in the SCG-3T. Likewise, if the monitor is out of adjustment then the SCG-3T will require compensating (and incorrect) adjustments made to it to give correct readings. Generally speaking such adjustments can be confirmed as being erroneous by carefully running through the entire setup procedure for the stereo generator. Some monitors can be checked out in the field without external equipment while some require more test equipment. The most valuable single piece of equipment the broadcaster can use to visually check a suspected condition is an industrial-grade wideband DC coupled oscilloscope. It is beyond the scope of this manual to give complete procedures in analyzing stereophonic waveforms, but an oscilloscope can give results whose accuracy will compete with the finest monitors.

SCG-3T STEREO GENERATOR

FINAL CHECKOUT SHEET

Date December 1, 1972

Tester H.A.

D.B.# 3551

Station Call KTHO

Serial No. 6354

NOTE: All performance data measurements referenced to 3.5 volts, p-p output for 100% Modulation.

Pilot Frequency 19.0

Pilot Injection 9.0

Signal-to-Noise Ratio

Demodulated Left -68 db

Demodulated Right -68 db

Input Level for 100%
Mod. @ 100 Hz +10.5 dbm

38 kHz Carrier Suppression

-63 db with no mod.

-60 db with 100%, 10 kHz

Distortion @ 400 Hz

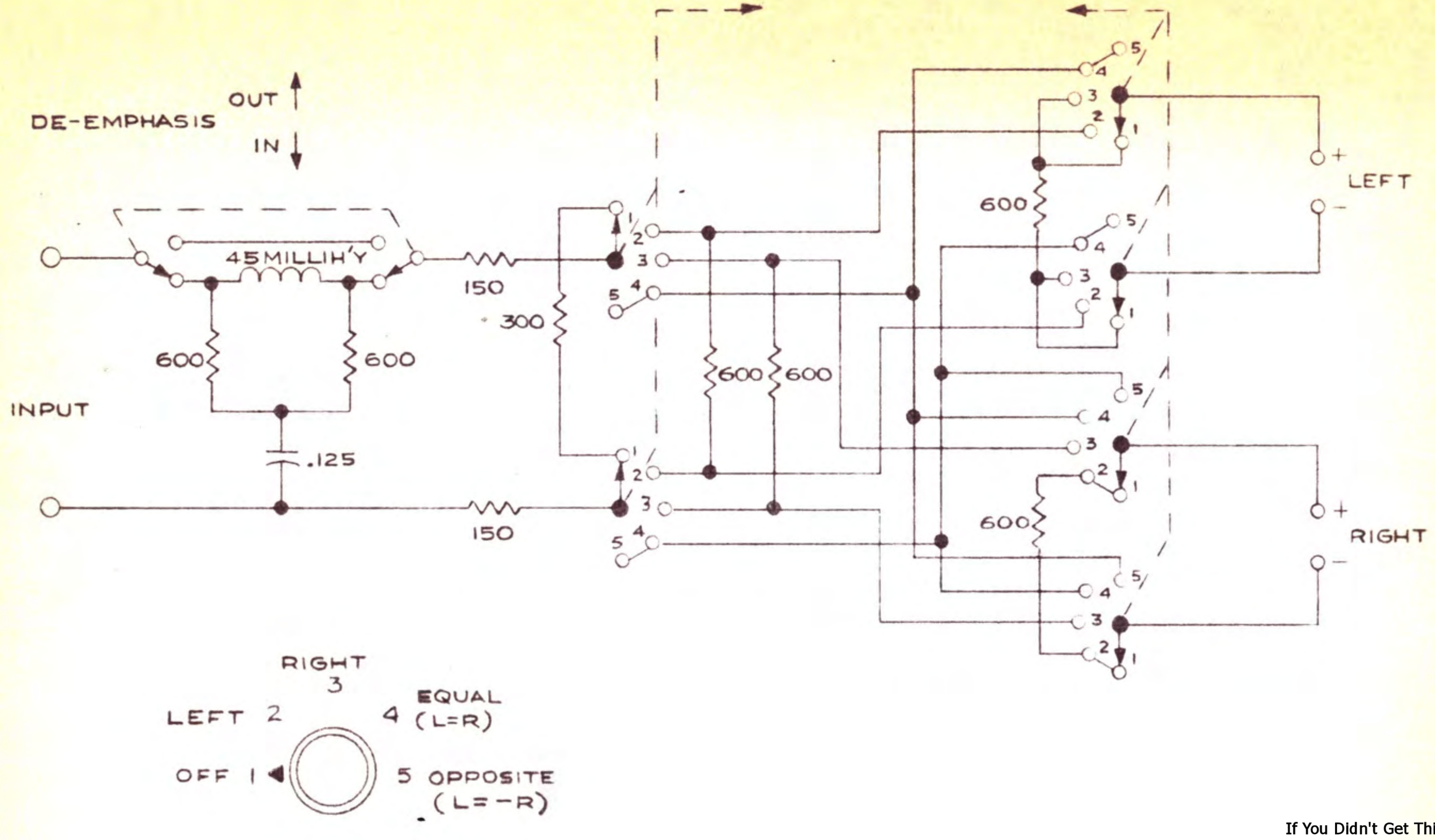
0.18 % Mono Left

0.20 % Stereo L, 0.21 % Stereo R

Hz	Separation		Cross Talk		L/Mono
	L into R	R into L	L+R to L-R	L-R to L+R	Freq. Resp.
50	-45	-42	-53	-51	+ .2
400	-48	-42	-54	-51	0
1000	-46	-43	-54	-51	- .8
5000	-44	-41	-54	-51	- 7.5
10000	-42	-40	-53	-51	-13.2
15000	-36	-36	-52	-51	-15.5

COMMENTS:

7/70 Moseley Associates, Inc.
ml



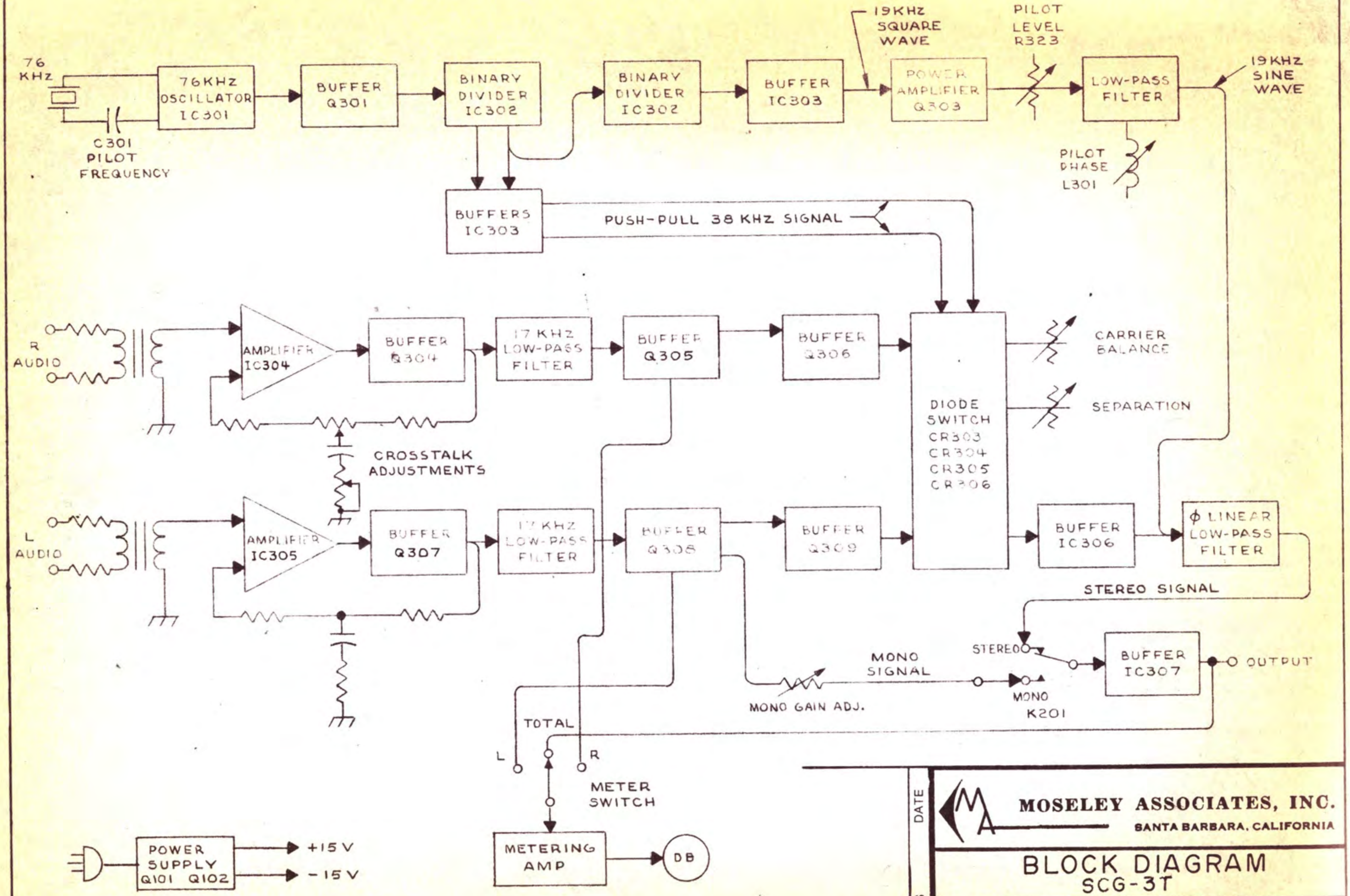
NOTES:

1 INTERNAL IMPEDANCE OF AUDIO OSC SHOULD BE 600 Ω
2 LOAD IMPEDANCE SHOULD BE 600 Ω RESISTIVE
3 600 Ω RESISTORS = 270 + 330, BRIDGED
4 45 MH INDUCTOR MAY BE UTC ADJUSTABLE TOROID

MOSELEY ASSOCIATES, INC.
SANTA BARBARA, CALIFORNIA

SCHEMATIC
STEREO TEST FIXTURE

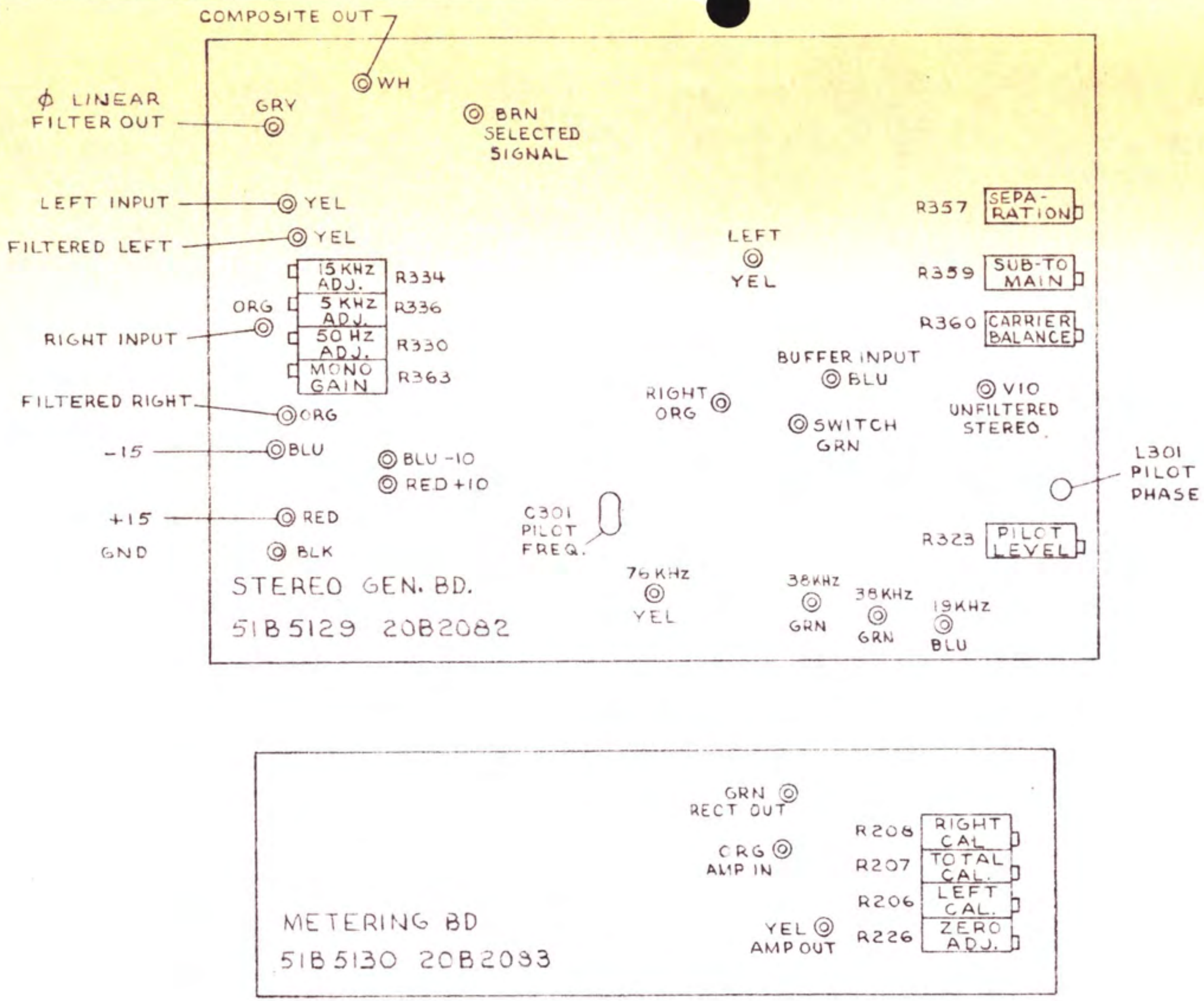
DATE / REVISIONS			
TOL. FRACT ± 1/32, .XX ± .030, .XXX ± .010			
DWN	JAG	8-69	SCALE:
CHK			91A6372
ENG	JGT	8-69	



MOSELEY ASSOCIATES, INC. SANTA BARBARA, CALIFORNIA			
BLOCK DIAGRAM SCG-3T			
TOL. FRACT ± 1/32, .XX ± .030, .XXX ± .010			
DWN	FXY	7/68	SCALE: NONE
CHK			92 A 1004
ENG	JC	7/68	

DATE

REVISIONS



REVISIONS	DATE
A REMOVE FILTER TERM POT	7/17/72

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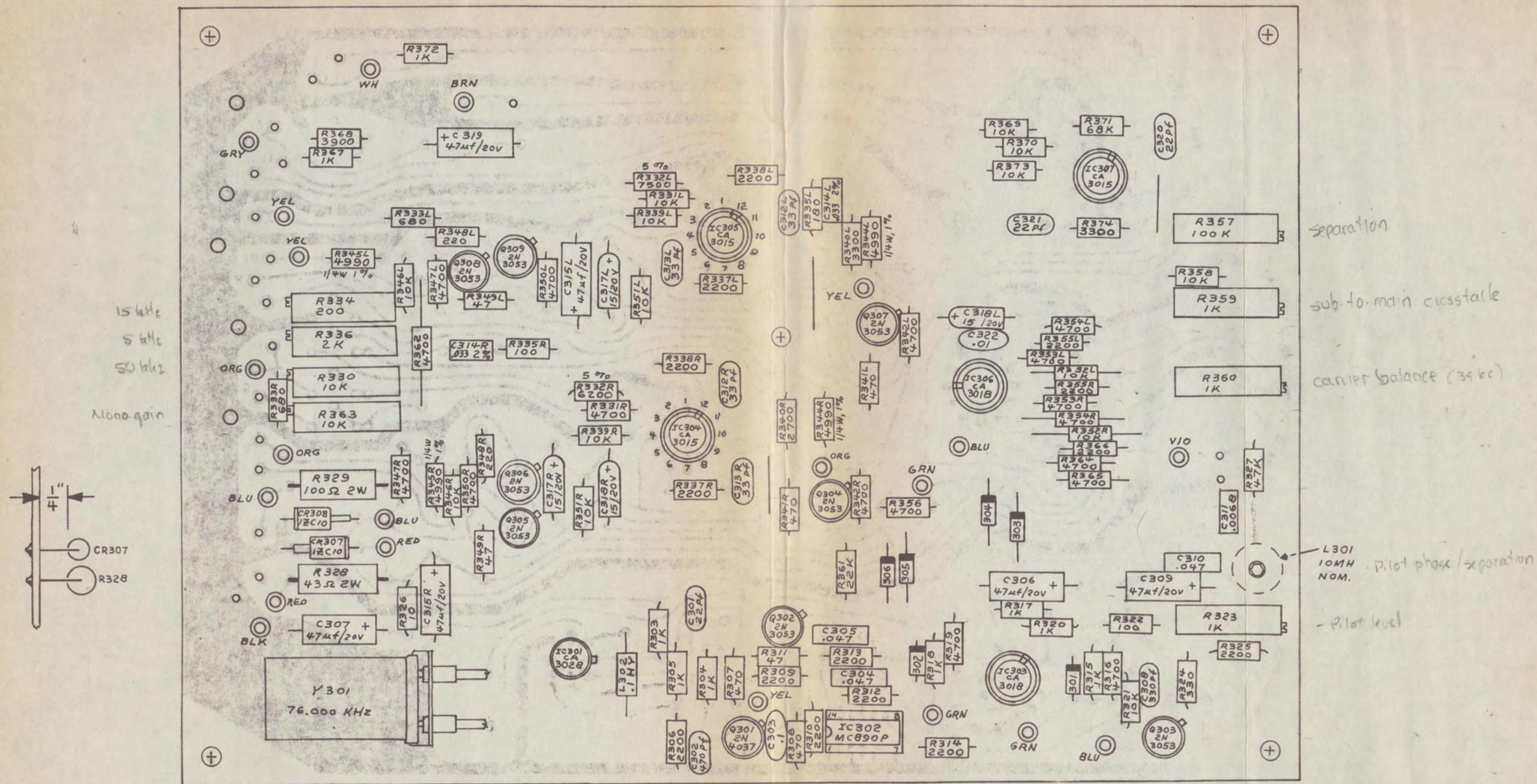
SANTA BARBARA, CALIFORNIA

CONTROLS & TEST POINTS
STEREO GENERATOR SCG-3T

TOL. FRACT ± 1/32 XX ± .030 XXX ± .010			
DWN	FXY	7/68	SCALE: HALF
CHK			SKA6222 A
ENG	JCT	7-68	



NOTES:

1 TRIM & DRILL BOARD PER 51B5129

2 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS, 1/2 W, 10%.
CAPACITOR VALUES ARE IN MICROFARADS.

3 (diode symbol) DENOTES IN4154 DIODE
(test point symbol) " TEST POINT JOHNSON # 105-850

4 SCHEMATIC 91C6271

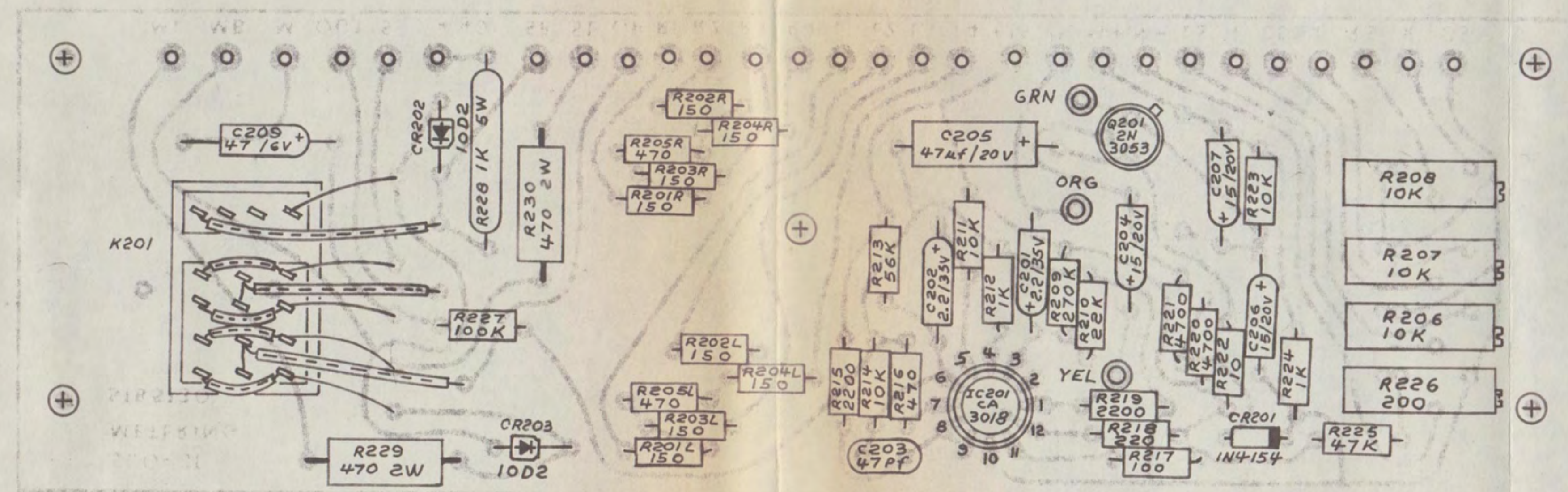
5 NEXT ASSEMBLY 21C2150

REVISIONS	DATE
M	C303 WAS .1 (MIDWEC) 9/13/71
L	R368 WAS 10K POT. R336 WAS 2500. R340R WAS 2200. ECO 447. 6/22/71
K	R328 WAS 33Ω. ADD SIDE VIEW. ECO 439 6/3/71
J	R371 WAS 47K. ECO 436. 5/5/71
I	R344 & 5 R&L WERE 1/2 W 4/6/71
H	MOVE L302 FOR ART-WORK CHANGE 5/70
G	R371 WAS 68K. R332L WAS 6800, R332R WAS 4700. ADD SOCKETS TO IC 301 & 302. ECO 323. 3-70
F	R328 WAS 47 Ω. ECO 268. 7-69
E	ADD PIN 12 TO IC303 C313R SAID R313R 5/69
D	DELETE R343 & C316 (R&L) R344 & 45 (R&L) WERE 4700 ECO 214 10/68
C	VALUE CHANGES PER ECO 205 10/68
B	REMOVE R301 & R30? ADD L302 ECO 183 Y11 TP WAS BLU 8/68
A	SWITCH GRY TEST PT. & STAND-OFF 7/68

MOSELEY ASSOCIATES, INC.
SANTA BARBARA, CALIFORNIA

COMPONENT LAYOUT
STEREO GEN. BD. 51B5129 SCG-3T

TOL. FRACT ± 1/32, XX ± .030, XXX ± .010			
DWN	F X Y	7/68	SCALE: FULL
CHK			20B2082
ENG			M



NOTES:

1 TRIM & DRILL BOARD PER 51B5130

2 UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS, 1/2W, 10%
CAPACITOR VALUES ARE IN MICROFARADS.

3 ◎ DENOTES TEST POINT JOHNSON #105-850

4 SCHEMATIC 91C6271

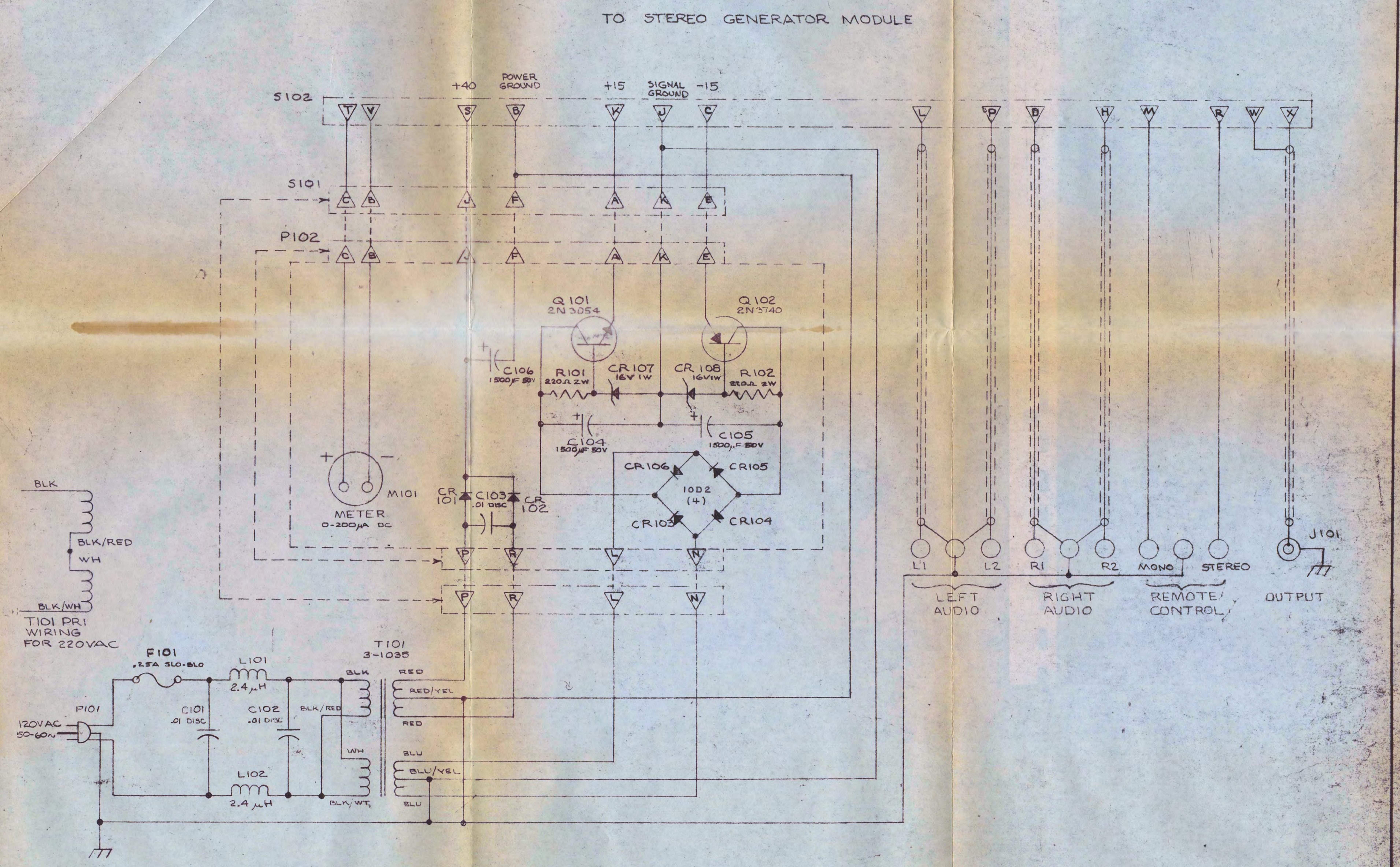
5 NEXT ASSEMBLY 21C2150

REVISIONS	DATE
A R201-4 R&L WERE 100Ω, R208R&L WERE 820Ω, ECO 436.	5/5/71

MOSELEY ASSOCIATES, INC.
SANTA BARBARA, CALIFORNIA

COMPONENT LAYOUT
METERING BD. 51B5130 SCG-3T

TOL. FRACT ± 1/32, XX ± .030, XXX ± .010			
DWN	FXY	7 68	SCALE FULL
CHK			20B 2083 A
ENG			



NOTES
1. CR1 THRU CR6 ARE 200 OR MORE P.I.V., 500 MA OR MORE
2. T1 HAS SPLIT PRIMARY FOR 117/240 VOLT OPERATION
3. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS 1/2 WATT 10%, CAPACITOR VALUES ARE IN MICROFARADS

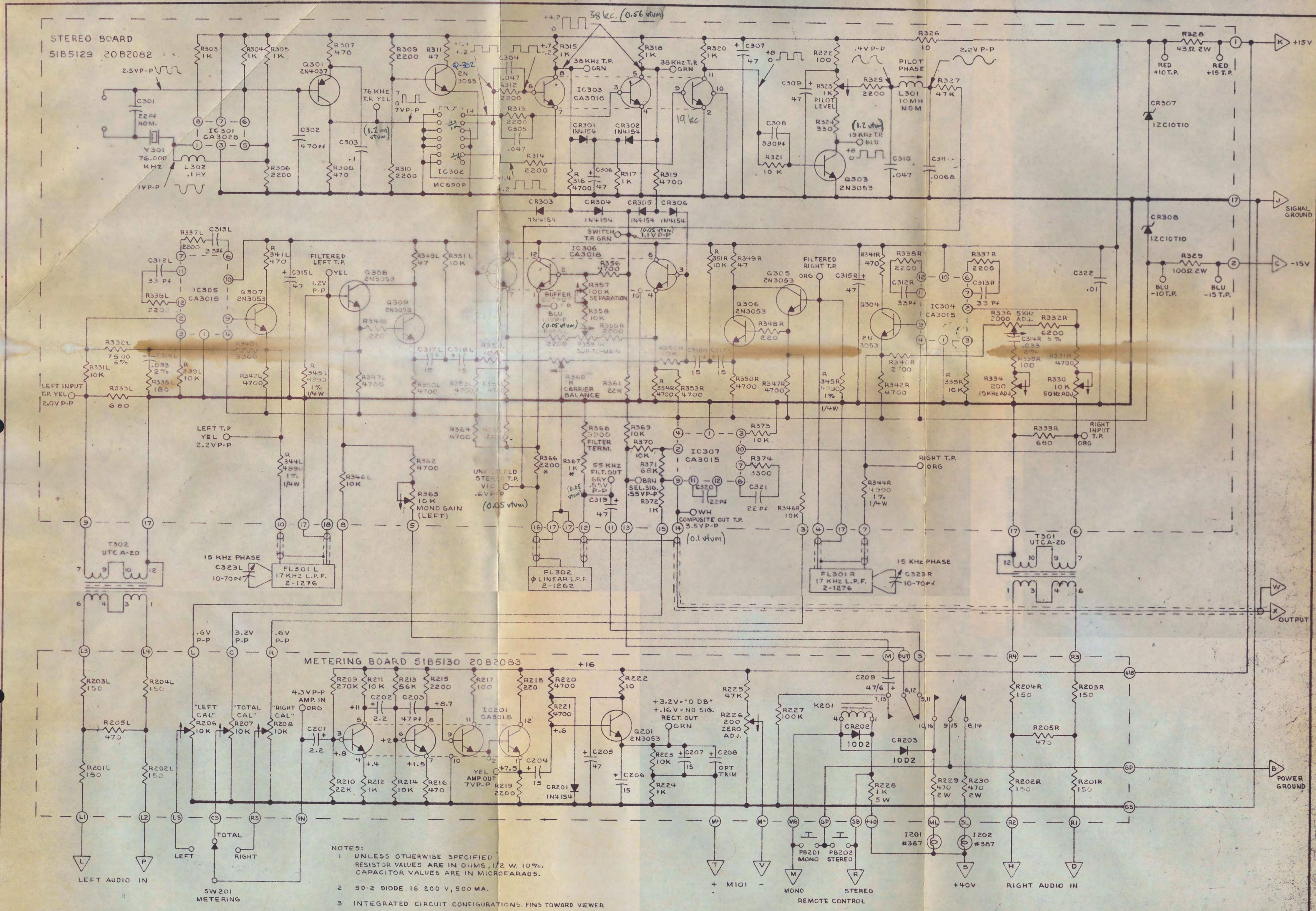
REVISIONS	DATE
A CR107 CR108 WERE 10V	8/68

MOSELEY ASSOCIATES, INC.
SANTA BARBARA, CALIFORNIA

SCHEMATIC
MAIN FRAME & PWR. SUPPLY SCG-3T

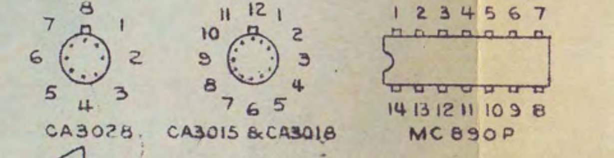
TOL. FRACT ± 1/32, .XX ± .030, .XXX ± .010

DWN	WTMM		SCALE:
CHK			91C6270 A
ENG	JCP	7-68	



NOTES:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/2 W, 10%. CAPACITOR VALUES ARE IN MICROFARADS.
2. SD-2 DIODE IS 200 V, 500 MA.
3. INTEGRATED CIRCUIT CONFIGURATIONS. PINS TOWARD VIEWER



4. ◁ DENOTES PIN ON P201
5. MAIN FRAME & POWER SUPPLY SCHEMATIC 91C6270
   BLOCK DIAGRAM 92A1004
6. * DENOTES SELECTED VALUE.

Parenthetical pencil voltages from Heathkit VTVM 1/24/76

REVISIONS		
J	ADD WAVE FORMS & VOLTAGE READINGS.	7/15/71
I	R368 WAS 2.5K POT. R336 WAS 2500. R340R WAS 2200. ECO 447.	6/21/71
H	R328 WAS 33Ω, 2W. ECO 439	6/3/71
G	R201-4 R&L WERE 100Ω. R205 R&L WERE 820. R371 WAS 47K. ECO 436.	5/5/71
F	R371 WAS 68K. R332L WAS 6800; R332R WAS 4700. ECO 323.	3-70
E	R328 WAS 47Ω ECO 268.	7-69
D	DELETE R343 & C316 (R&L) R344 & 45 (R&L) WERE 4700. ECO 214	10/68
C	ADD C323 R&L. CHANGES PER ECO'S 205, 206	10/68
B	GROUND T301 & T302 CASE ECO 196	9/68
A	REMOVE R301 & R302 ADD L302-76 KHz T.P. WAS BLU ECO 180	8/68

MOSELEY ASSOCIATES, INC.
SANTA BARBARA, CALIFORNIA

SCHEMATIC
STEREO GENERATOR MODEL SCG-3T

TOL. FRACT ± 1/32, .XX ± .030, .XXX ± .010			
DWN	FXY	7/68	SCALE: NONE
CHK			91 C 6271 J
ENG	JLT	7-68	