

*Kustom*<sup>®</sup>



OWNER'S MANUAL



**SOUND**

**REINFORCEMENT**

**MIXER**

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P / N 006-0089-00

# KUSTOM WARRANTY

All Kustom amplifiers, power units, mixers, and their associated components and parts, except as specified below, are guaranteed, by Kustom Electronics, Inc., to the original purchaser to be free of defects in material or workmanship for a period of five (5) years from the date of purchase.

— and —

All Kustom speaker cabinets and their associated components and parts, except as specified below, are guaranteed, by Kustom Electronics, Inc., to the original purchaser to be free of any defects in materials and workmanship for a period of one (1) year from the date of purchase.

— provided —

- (1) The original purchaser applies for a Kustom Warranty Card for the guaranteed product(s) within 10 days of the date of purchase; and,
- (2) Within the applicable period of this guarantee, the original purchaser delivers, at his own expense, the defective product(s) to an Authorized Kustom Dealer or Service Center for repair; or, where no such dealer or service center is nearby, obtains at his own expense from Kustom Electronics, Inc., an "Authorization Number" to return merchandise and ships, at his own expense, the defective product(s) to Kustom Electronics Customer Service, 909 W. Cherry, Chanute, Kansas 66720. The repaired product(s) will be returned freight prepaid.

Kustom Electronics, Inc., will, at its option, repair or replace the defective part(s) or product(s).

Excluded from coverage by this warranty are exterior surfaces and finishes, face panels, grill cloth, covers, knobs, handles, casters and appearance items.

Any modification of the Kustom-manufactured product(s) such as the installation of substitute parts, rewiring or other changes to the system without written authorization from Kustom Electronics, Inc., will automatically void this warranty.

Kustom Electronics, Inc., shall not be liable for any direct, special, incidental or consequential damages incurred by reason of a breach of the above provisions, except as expressly provided above.

The provisions of this warranty shall be covered by the local laws of the state where the original purchaser shall purchase products covered hereby, and shall be enforceable only to the extent, and in the manner, permitted under such laws.

**EXCEPT AS HEREIN EXPRESSLY PROVIDED, KUSTOM ELECTRONICS, INC., MAKES NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.**

# KUSTOM XII SRM

HiZ/LoZ Inputs  
(ON BACK OF UNIT)

## Master Controls Left

Peak Level  
Master Reverb  
Main Level  
Equalizer

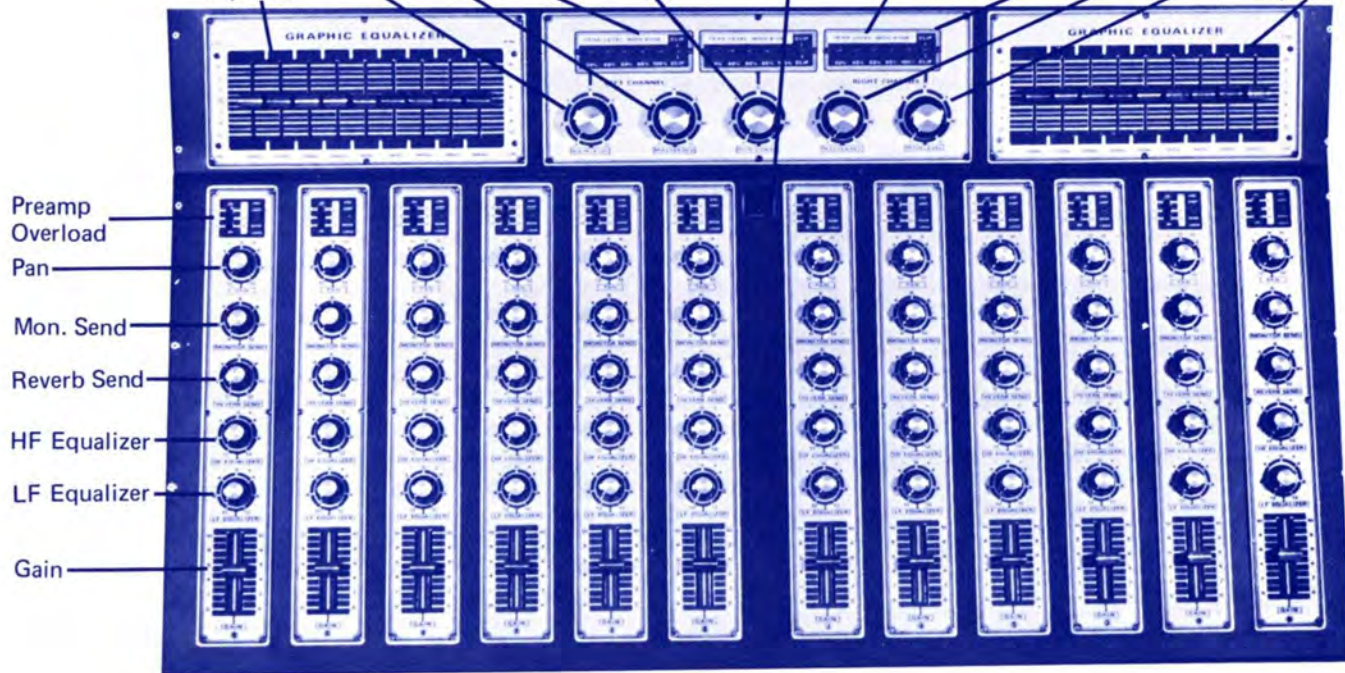
Monitor Signal

On-Off

Mon. Peak Level

## Master Controls Right

Peak Level  
Master Reverb  
Main Level  
Equalizer



## **INTRODUCTION**

The Kustom XII SRM is a high-performance, state-of-the-art stereo sound reinforcement mixing console which will provide exceptional performance and reliability when operated correctly. This instruction manual provides useful information which could prevent problems on a gig. A little time spent reading the manual could save a lot of time trying to find problems that do not exist.

## **GENERAL**

The Kustom XII SRM is a 12-input stereo mixer designed to drive external power and monitor amplifier systems. The mixer is equipped with LED peak-level indicators instead of conventional VU meters. These devices allow the operator to detect extremely fast transients which would go unnoticed by a standard VU meter. The mixer is specifically designed to drive the Kustom VIII SRS (200-watt RMS bi-amp slave), or the Kustom XII SRS (400-watt RMS bi-amp slave), and the Kustom III Monitor, a 125-watt RMS monitor power amplifier/graphic equalizer. Several loudspeaker systems are also available for use with these power amplifiers.

## **INPUTS**

The Kustom XII SRM is equipped with both high and low impedance inputs. It should be noted that only one input is operative at a time. For example, if a low impedance microphone is in use and a high impedance unit is plugged in, only the high impedance input will function.

## OUTPUTS

The Kustom XII SRM main outputs are low impedance type (less than 600 ohms), and will drive almost any type of power amplifier to full output. At 100% indication on the LED Peak Level Indicators, the output levels will be 1.0 volt RMS.

The monitor outputs are also of the low-impedance, line-level type. Like the main outputs, the 100% indication is 1.0 volt RMS.

## CONNECTION AND LOCATION

Place the mixer at the desired location and connect the mixer output to the bi-amplifier slaves or power amplifiers using shielded microphone cable. Due to the very low impedance output from the mixer, this cable may be up to 200 feet long. Ideally, an operator should adjust the console during the performance, and the console should be located where the operator can hear the reinforced sound and make adjustments as necessary. If this is not possible, locate the console on the stage with easy access by the musician/operator. It is strongly recommended that the console not be placed on top of or in front of speaker cabinets (especially bass); this will cause vibration in the mixer's reverb spring assembly.

If a monitor system is used, plug the monitor drive cable into the MONITOR OUTPUT jack. This cable may also be up to 200 feet in length without excess high frequency losses.

### NOTE

If excessive 60Hz hum is noted in the main or monitor systems, it is likely that the console and the power amplifiers are plugged into different phases of the building AC distribution system. This is a common occurrence whenever the console is located some distance from the power amplifiers and speaker system. To correct this problem use a line isolation plug (available at any hardware store) on the **power amplifier** line cord(s).

## OPERATION

If possible, locate the speaker systems in front of and directed away from the microphones, greatly reducing the possibility of feedback. Feedback will occur with any type of PA system, regardless of size or price, whenever the loudness is increased past a critical point determined by microphone location, speaker placement, and room acoustics. Usually little can be done to correct for proper room acoustics. However, with proper microphone selection and speaker placement, the possibility of feedback can be greatly reduced.

For an initial set up, it is suggested that all low frequency and high frequency equalization controls be adjusted to the "0" or 12 o'clock position and the graphic equalizer slides be placed in the center of their operating range. This will place the console in an electrically "flat" frequency response state.

The following procedure of professional sound reinforcement techniques should be followed until you are thoroughly familiar with the mixer and its capabilities:

1. Adjust all equalization controls for a "flat" response as previously described. All input PAD switches should be in the position 0. Adjust the HORN LEVEL control to the position 5.
2. Adjust the MAIN LEVEL controls to position 5.
3. Set all PAN controls at 12 o'clock (position 0).
4. With program material into the first channel adjust the GAIN control slides for the desired loudness level. If the LED PEAK OVERLOAD indicator is indicating a preamplifier overload condition, either reduce the GAIN slides' position or place the input PAD switch to the -10dB or -20dB position as required.

5. Adjust the channel equalization controls for the desired amount of equalization. Note the LED PEAK LEVEL indicator as boosting of certain frequencies may have caused an overload condition.
6. Adjust the MASTER REVERB control to position 5.
7. Adjust the channel REVERB SEND control for the desired amount of reverberation.
8. Adjust the PAN control for stereo balance.
9. Note the MAIN LEVEL LED PEAK LEVEL indicators. Under normal operating conditions (maximum output) the indicators should be indicating 80% to 100% with occasional peaks in the CLIP region. Adjust the MAIN LEVEL and channel GAIN controls for the desired sound pressure level without overloading the mixer. Overloading or "clipping" is constantly monitored by the channel input LED peak overload indicators and the MAIN LEVEL LED peak level indicators. Adjust the channel GAIN and MAIN LEVEL controls as a team for optimum signal-to-noise ratio. An indication of incorrect operation is when either the MAIN LEVEL or the channel GAIN controls are at maximum.
10. Adjust the total system for the desired sound pressure level or until feedback occurs.
11. If feedback occurs, the graphic equalizers should be used to "notch out" the feedback frequency(s). Graphic equalization is a valuable tool if used correctly, but a real problem if incorrectly used. Professional sound engineers generally agree that the more graphic equalization used, the worse the overall sound will be. Some use the graphic equalizer for "room equalization". This practice is acceptable if the operator remembers that the room is not really equalized at all locations, just at the point where his ears and the equalizer are located. Rooms contain dead spots or locations where some frequencies disappear entirely; this is a normal phenomenon and occurs in every type of enclosure from the smallest night club to the most professional recording studio.

The graphic equalizer is a valuable tool if used properly. Always use one slide at a time, and if the desired results are not obtained, return it to the center position and proceed to the next slide.

12. Readjust the HORN LEVEL control (located on the power slave unit) as required for the desired bass and treble balance. No amount of channel equalization or graphic equalization will bring up the "high end" if the HORN LEVEL control is turned down or off.
13. After the main system is adjusted and a monitor system is in use, adjust the channel MONITOR SEND and MAIN LEVEL controls for the desired monitor levels. Observe the MON LEVEL LED peak level indicators to prevent overloading of the monitor slave units.

The preceding procedure is typical of the operation of a professional sound reinforcement system. All operating situations were not covered because every location and type of music is different.



## GRAPHIC EQUALIZER

The dual nine-band (frequency) graphic equalizer section of your Kustom XII SRM represents the ultimate in feedback and equalization control flexibility. Nine points (60Hz, 125Hz, 250Hz, 500Hz, 1.0KHz, 2.0KHz, 4.0KHz, 8.0KHz, and 16.0KHz) are provided to allow for adjustment in the most critical portion of the audio spectrum. A maximum of  $\pm 12.0$ dB of boost and cut is provided at each of these frequencies. As a point of interest, each of the frequencies represents the center point on the frequency at which maximum control action occurs. The actual control action at 125Hz, for example, is that the frequencies in the range of 60Hz to 200Hz are boosted or cut. This allows a smooth response to be obtained over a usable portion of the audio spectrum.

It is suggested that when first setting up a system for operation that all of the equalizer controls be adjusted to the center or flat position. This will eliminate the possibility of feedback, or if all controls are in the "cut" position, the apparent loss of signal level. Normal operating procedure is to use the individual channel tone controls to adjust for the desired sound, and then use the graphic equalizer to compensate for poor room acoustics and feedback.

There is no simple way to "equalize out" a room. The quickest (and often the best) method is to carefully listen to the system and make small adjustments to achieve the desired sound. It should be remembered that the sound the operator hears and adjusts for is only in the one spot where he is located. At any other point in the room or club, the sound will be slightly different due to room acoustics (carpeting, reflections off walls, and many other factors).

When using the graphic equalizer for feedback control, find the feedback frequency by adjusting each of the equalizer controls. Once the frequency and corresponding control is located, adjust the equalizer only to the point at which the feedback stops. Once this point is reached, no further feedback control improvement will result, and the overall sound quality will be degraded.

# MICROPHONES

## CARDIOID MICROPHONE

The pickup pattern of a cardioid microphone — relatively dead at the sides and rear — tends to increase the working distance (the distance between the sound source and the microphone) beyond which:

1. The sound becomes over-reverberant.
2. The pickup of random background noise becomes excessive.
3. Sound system feedback results.

This increase in working distance is theoretically more than 1.7 to 1. For instance, if the maximum effective working distance of an omnidirectional microphone is 10 inches, then a cardioid mike can be used at 17 inches with the same effectiveness!

The feedback-reducing characteristics of a cardioid microphone would seem to make a clear-cut case for the use of a cardioid microphone by professional performers. In marginal feedback systems, the cardioid will tend to produce a higher level in the room before system feedback, especially where high levels of direct speaker sound reaches the microphone from the sides or rear. This situation is often encountered in portable PA systems as well as other systems employing high-level stage monitors. Usually in such instances, the loudspeakers are closer to the microphones than would be desirable from a sound-system design standpoint.

## OMNIDIRECTIONAL MICROPHONE

In many systems where loudspeakers are located 20 to 40 feet away from the microphone — as at the top of a proscenium arch — a cardioid microphone is likely to show only negligible advantage with respect to feedback over an omnidirectional microphone. This is especially true where extremely close working distances are employed — say 1/8 to six inches.

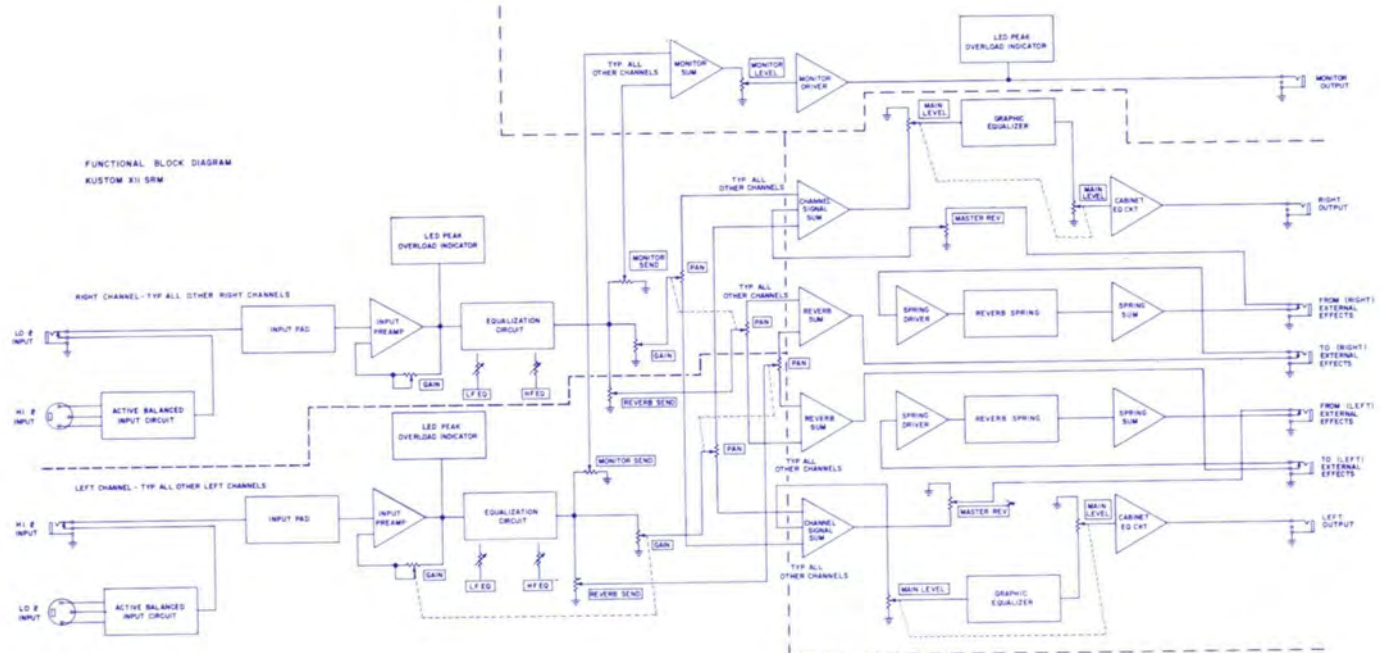
The omnidirectional microphone, where it can be used, has several advantages in its favor:

1. For a given price, an omnidirectional microphone generally has a smoother frequency response than its cardioid counterpart. Such smoothness of response is important because any roughness invites feedback.
2. An omnidirectional microphone is significantly less susceptible to breath pops than its cardioid counterpart.
3. An omnidirectional microphone is significantly less sensitive to mechanical shock than its cardioid counterpart.
4. An omnidirectional microphone is often more rugged than its cardioid counterpart.

## TECHNICAL SPECIFICATIONS

Preamplifier gain measured at 1.0KHz. Equalizer controls maximum.	16.0dB
Signal-to-noise ratio.	Gain min. -84.0dB Gain max. -58.0dB
Minimum input voltage required for rated output. Equalization controls adjusted for 12 o'clock position. Gain controls adjusted for maximum.	13mV RMS
Main channel output at 100% indication of peak level indicator.	1.0V RMS
Monitor channel output at 100% indication of peak level indicator.	1.0V RMS
Rated minimum load impedance for MAIN and MONITOR outputs.	600 ohms
Channel equalization control range:	
HF Equalization	±12.0dB @ 10.0KHz
LF Equalization	±10.0dB @ 50.0Hz
Graphic Equalizers	±12.0dB @ each frequency
Frequency response measured with equalization controls indicating flat response.	±2.0dB, 40Hz-17KHz
Total harmonic distortion at normal (100% indication) operating levels.	0.15%
AC accessory receptacle maximum load.	200 watts

# FUNCTIONAL BLOCK DIAGRAM

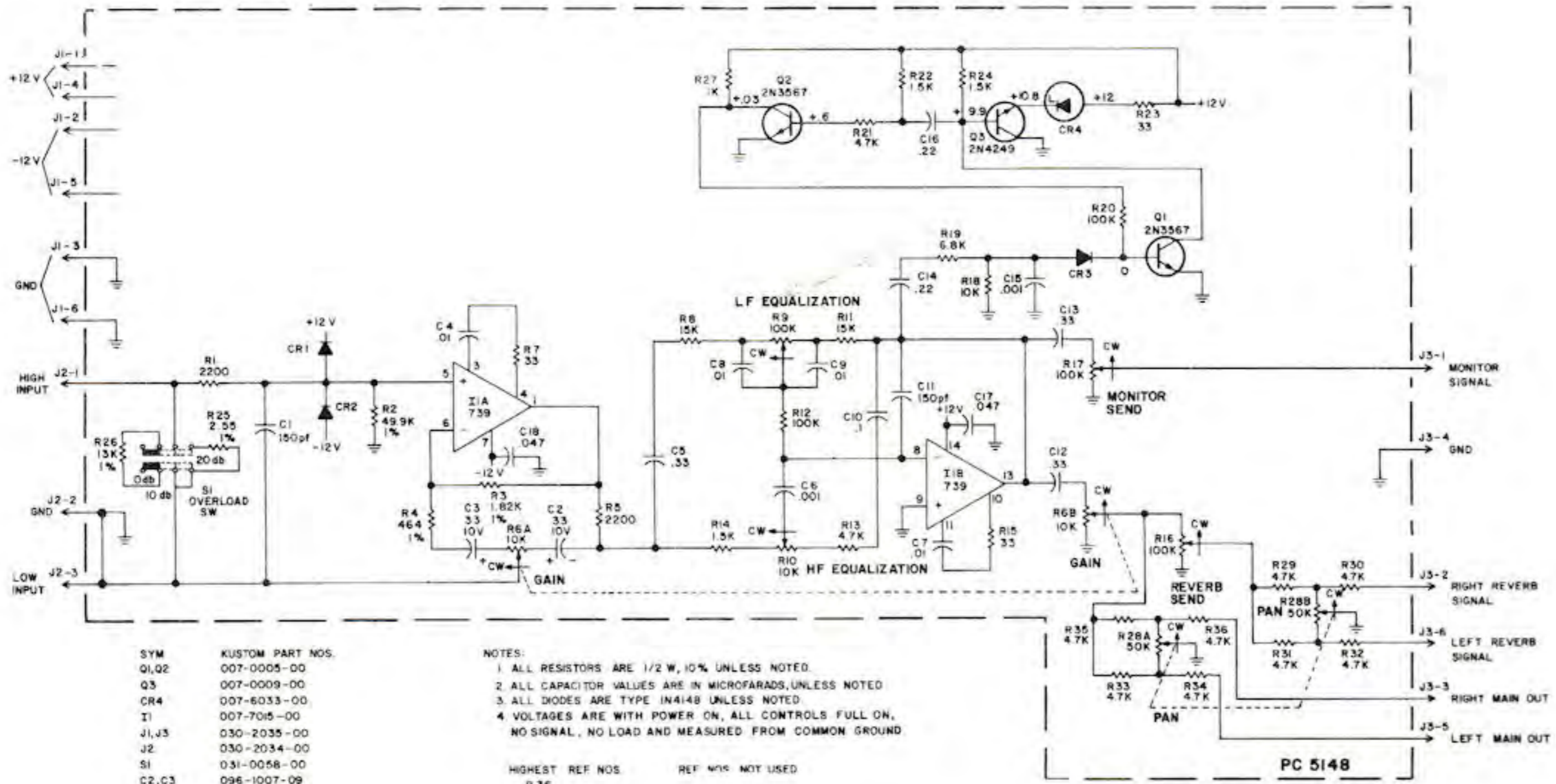




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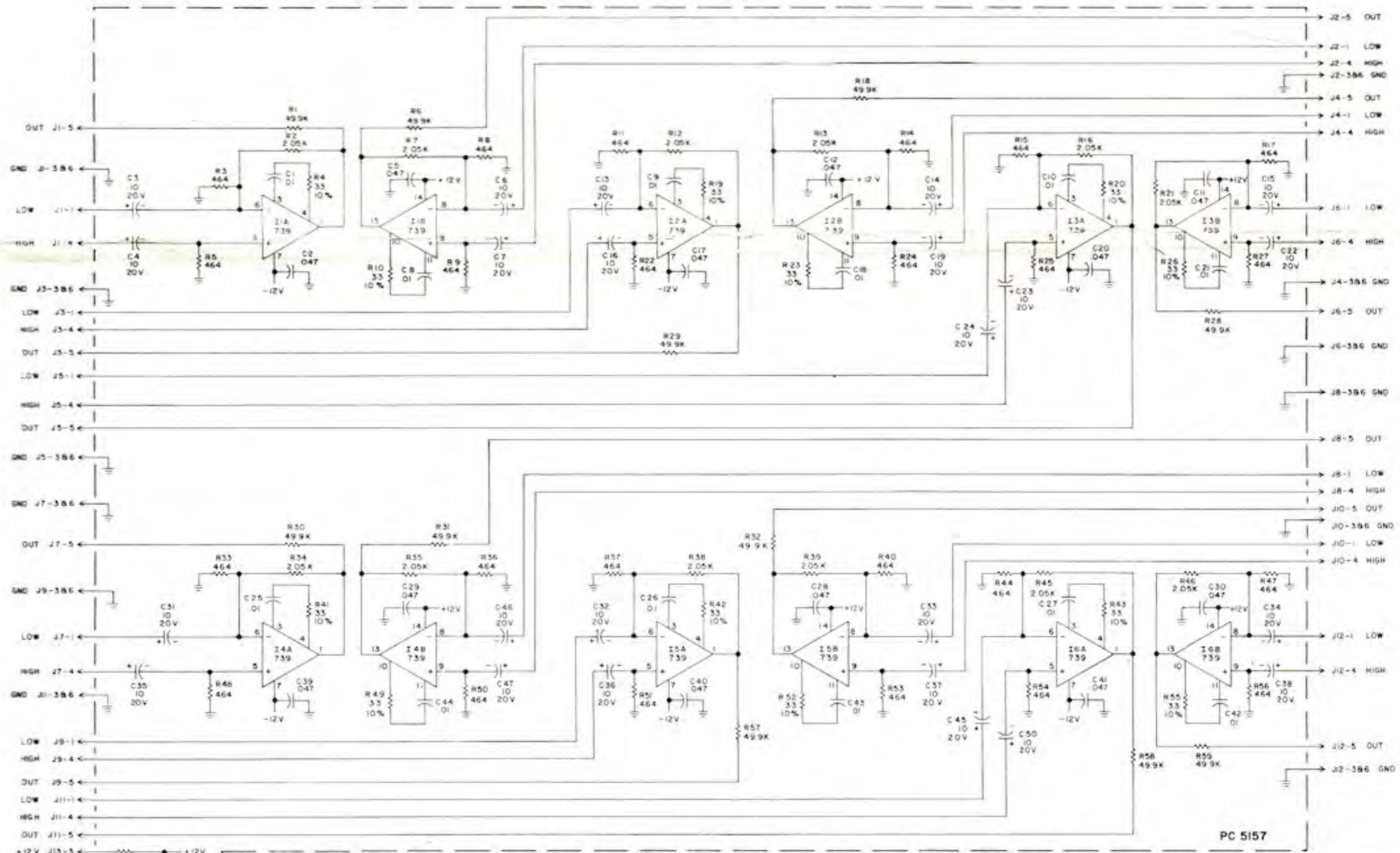
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Q3	007-0009-00
CR4	007-6033-00
I1	007-7015-00
J1, J3	030-2035-00
J2	030-2034-00
SI	031-0058-00
C2, C3	096-1007-09
R26	125-1302-01
R3	125-1821-01
R25	125-2551-01
R4	125-4640-01
R2	125-4992-01
R6	133-0061-01
R10	133-0022-00
R9, R16, R17	133-0021-00
R28	133-0068-00

- NOTES:
1. ALL RESISTORS ARE 1/2 W, 10% UNLESS NOTED.
  2. ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS NOTED.
  3. ALL DIODES ARE TYPE IN4148 UNLESS NOTED.
  4. VOLTAGES ARE WITH POWER ON, ALL CONTROLS FULL ON, NO SIGNAL, NO LOAD AND MEASURED FROM COMMON GROUND.

HIGHEST	REF NOS.	REF NOS NOT USED
	R 36	
	C 18	
	CR 4	
	I 1	
	J 3	
	Q 3	
	SI	

REV D MODS		DATE		BY		TO		REASON	
1	5/77	5/74	SHAY	5-74	SHAY	NONE			
2	18/00	8/74	Z.G.	8-74	Z.G.	NONE			
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								002-5148-00	

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SYM	KUSTOM P/N	SYMBOL	KUSTOM PART NO
C31,C35,C46, C47,C32,C36, C33,C37,C45, C50,C34,C38	096-1007-08	I1, I2, I3, I4, I5, I6	007-7015-00
C48, C49	096-1007-10	J7	030-2034-00
R4, R10, R19, R23, R20, R26, R41, R49, R42, R52, R43, R55	130-0330-15	JL2, J3, J4, J5, J6	030-2035-00
R60, R61	096-1007-08	C3, C4, C6, C7, C13, C6	096-1007-08
		C14, C19, C24, C23, C15, C22,	

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I6	
J13	

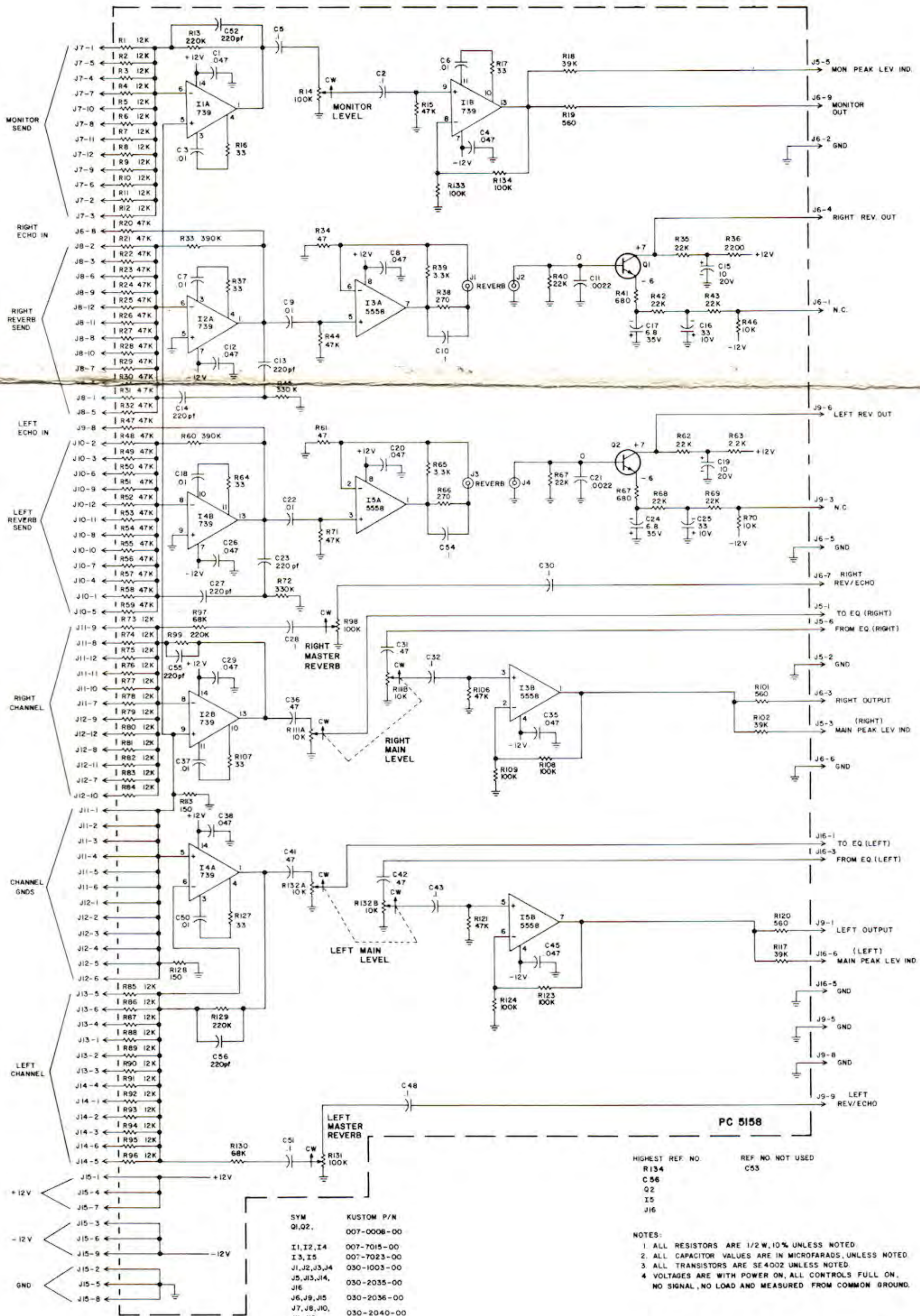
NOTES  
 1 ALL RESISTORS ARE 1/8W, 1% PRECISION, UNLESS NOTED.  
 2 ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS NOTED

REV	NO	DATE	BY	DESCRIPTION	ITEM

**Kustom ELECTRONICS, INC.**  
 CHARLOTTE, N.C. 28210

DESIGNED BY	DATE	EQUIVALENT
SHAY	5-74	NONE
CHEK BY	DATE	NAME
W. G. G.		
TESTED BY	DATE	PART NUMBER
NONE		002-5157-00





HIGHEST REF. NO. R134  
 C56  
 Q2  
 I5  
 J16

REF. NO. NOT USED  
 C53

- NOTES:
1. ALL RESISTORS ARE 1/2W, 10% UNLESS NOTED
  2. ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS NOTED
  3. ALL TRANSISTORS ARE SE4002 UNLESS NOTED
  4. VOLTAGES ARE WITH POWER ON, ALL CONTROLS FULL ON, NO SIGNAL, NO LOAD AND MEASURED FROM COMMON GROUND.

SYM	KUSTOM P/N
Q1, Q2	007-0008-00
I1, I2, I4	007-7015-00
I3, I5	007-7023-00
J1, J2, J3, J4	030-1003-00
J5, J13, J14, J16	030-2035-00
J6, J9, J15	030-2036-00
J7, J8, J10, J11, J12	030-2040-00
C15, C19	096-1007-08
C16, C25	096-1007-09
C17, C24	096-1007-29
R14, R98, R131	133-0021-00
R111, R132	133-0053-00

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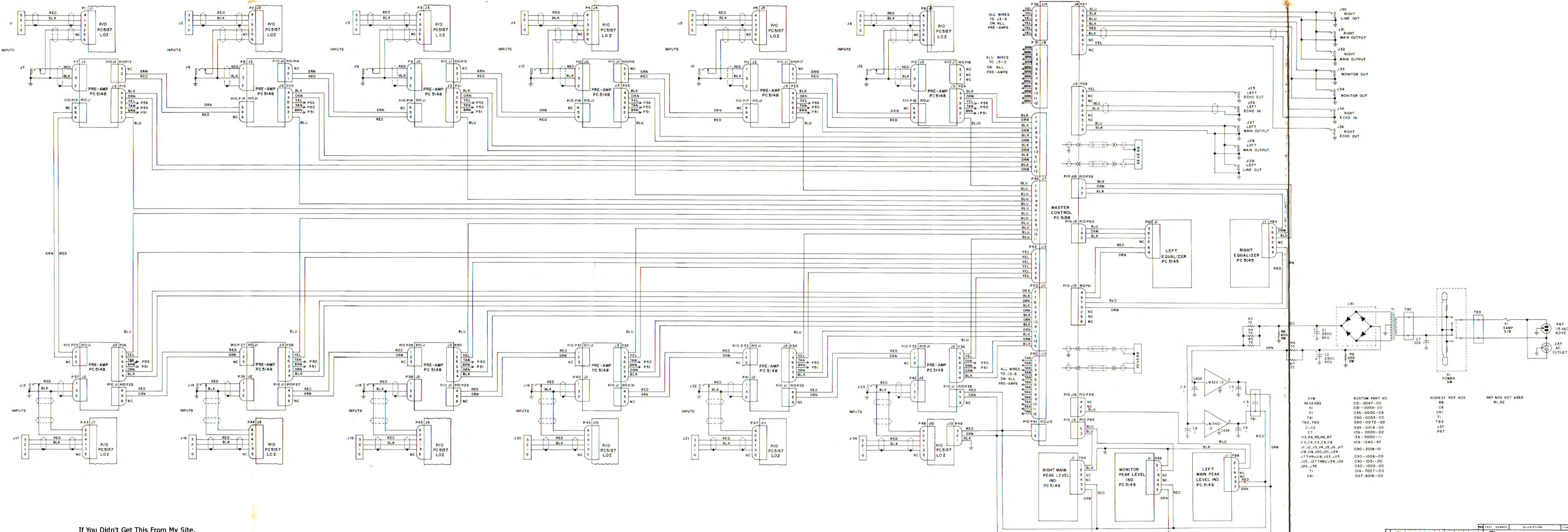
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BY	5-74		SHAY
BY	4-11-74		BIG
BY			SCALE
BY			NONE

**Kustom ELECTRONICS, INC.**  
 CHARLOTTE, KANSAS 64738

TOLERANCES  
 NONE

12 CH. MASTER BD. PC 5158

002-5158-00



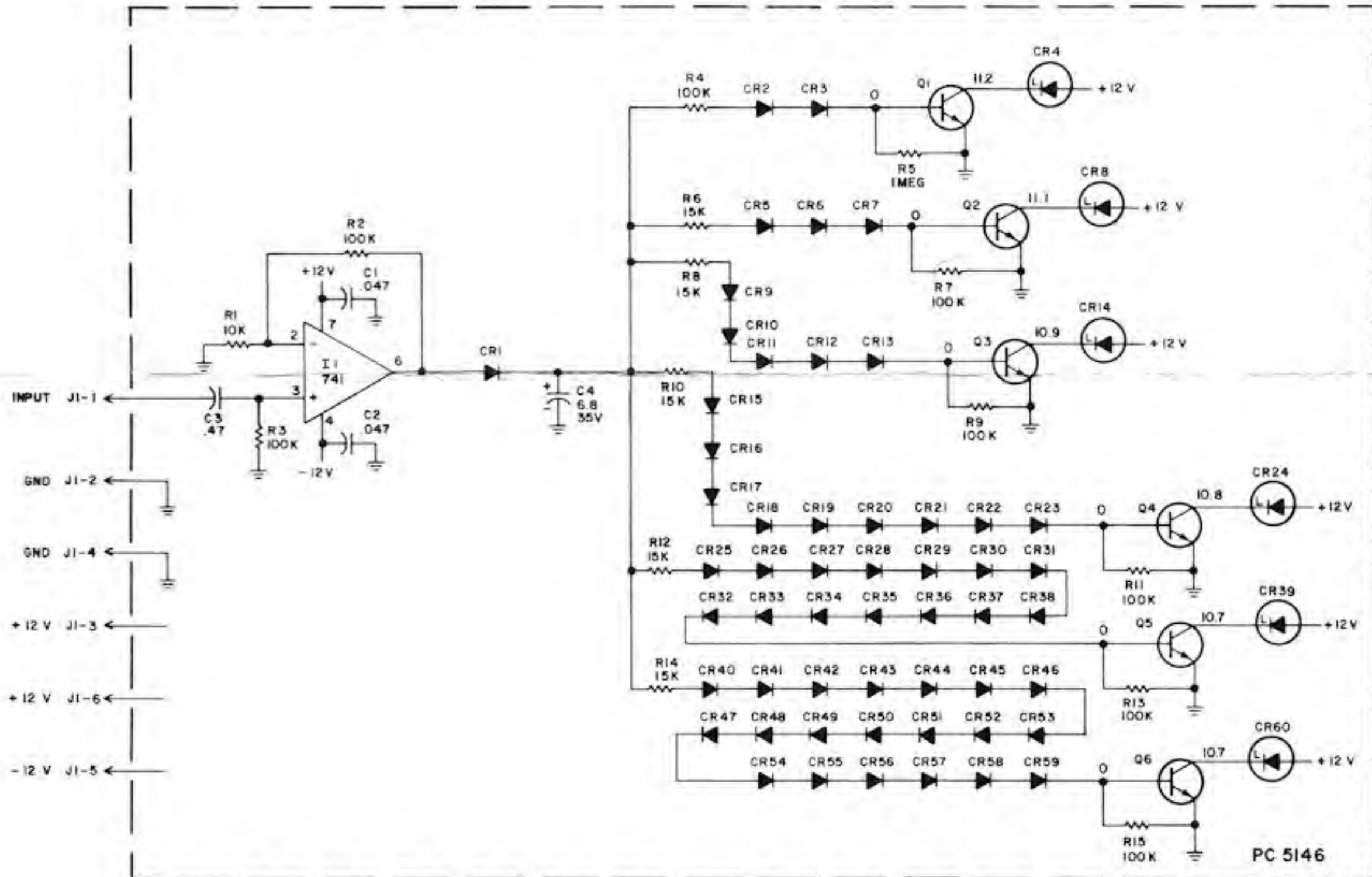
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SYM	KUSTOM PART NO	HIGHEST REF NOS	REF NOS NOT USED
REVERBS	031-0047-00		RL, RE
F1	031-0058-00		
TB1	036-0000-05		
TB2, TB3	090-0093-00		
CL1, C2	098-0014-00		
C7	106-0000-02		
R3, R4, R5, R6, R7	136-0000-11		
C3, C4, C5, C6, C8	109-1040-47		
J1, J2, J3, J4, J5, J6, J7	030-2018-01		
J7 THRU J16, J22, J23	030-1006-00		
J25, J27 THRU J34, J36	030-1001-00		
J26, J35	030-1000-00		
T1	019-7027-00		
CRI	007-6018-00		

REV	DATE	BY	DESCRIPTION
1			
2			
3			
4			
5			
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PART NUMBER	DESCRIPTION	QTY
SHAY 7-74	ELECTRONICS, INC.	
	CHENUTI, KAN 66720	
	REVISION:	
	NONE	
	MIMI INTERCONNECT DIA.	
	KUSTOM XII SRM	
	REV NUMBER	
	002-0133-00	



PC 5146

- NOTES:
1. ALL RESISTORS ARE 1/2W, 10% UNLESS NOTED
  2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
  3. ALL DIODES ARE IN4148 UNLESS NOTED.
  4. VOLTAGES ARE WITH POWER ON, ALL CONTROLS FULL ON, NO SIGNAL, NO LOAD AND MEASURED FROM COMMON GROUND

SYMBOL	KUSTOM PART NO.	HIGHEST REF. NO.	REF. NO. NOT USED
Q1, Q2, Q3, Q4	007-0005-00	Q6	
Q5, Q6	007-0008-00	CR60	
CR4, CR8, CR14, CR24, CR39, CR60	007-6033-00	I1	
I1	007-7042-00	J1	
J1	030-2035-00	C4	
C4	096-1007-29	R15	

REV	BY	DATE	DESCRIPTION
1	SHAY	5-74	INITIAL DESIGN
2	J.G.	6-11-74	REVISED
3	SHAY	7-11-74	REVISED

**Kustom ELECTRONICS, INC.**  
CHANUTE, KANSAS 66720

TOLERANCES	NONE
NAME	PEAK LEVEL IND PC 5146
PART NUMBER	002-5145-00