

Service Manual

400RB

 **GALLIEN-KRUEGER**

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OPERATORS MANUAL 400RB

THE BASICS

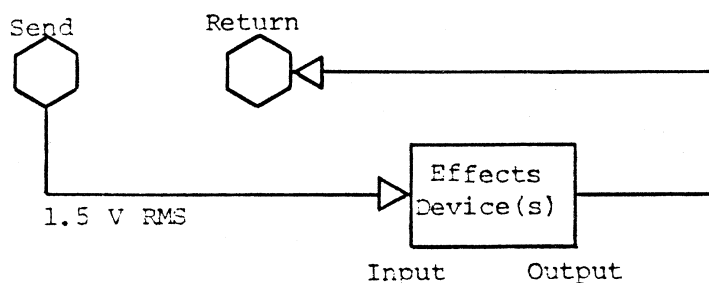
Your new 400RB represents the latest advances that technology has to offer. It was designed to provide the widest possible range of usable sounds. The combination of three voicing filters with four bands of active EQ is unbeatable for flexibility and ease of operation. This amplifier has many features, all of which are described here. A careful examination of this manual will help you to get the most from them.

INPUT SECTION

This section contains the 1/4" input jack and the input attenuator. With the attenuator out the maximum input level is 1V rms (3V P-P). For larger input signals the input attenuator should be set. This reduces the gain of the input stage by 10 dB, increasing the input head room to 3V rms (10 P-P).

EFFECTS LOOP

Located on the rear panel, it is provided for the insertion of effects. It is post EQ but pre boost and master. Using standard guitar cords connect the effects input to the send and the effects output to the return. The boost and master controls will effect any signal put into the return jack. The level is 1.5V rms (4.5V P-P) into 100K ohm.



DIRECT OUT

This output will put 500mv into 600 ohms unbalanced. It can be used with a direct box or can be connected directly to the high "Z" input of a mixer.

SPEAKERS

Two speaker jacks are provided on the rear panel and will accept

SPEAKERS CONT.

a total load of 4 ohms. Lower impedances should not be used. This unit can drive one four ohm speaker or two eight ohm speakers, maximum. Higher impedances such as eight or sixteen ohms are acceptable. No damage will result from operating the amplifier with the speaker disconnected.

POWER SWITCH

The power switch and associated pilot light are located in the lower right hand corner of the front panel.

FUSE

Located on the rear panel, never operate this amplifier with any other than the recommended fuse.

120V operation - replace with type 3AG4A

240V operation - replace with type 3AG2A

MAINTENANCE

Your new amplifier is rugged. It was built to give you a lifetime of trouble-free operation if it is operated in accordance with the instructions above. The only maintenance required is cleaning. We recommend a soft damp cloth and mild soap for cleaning the outside surfaces. If you are going to pack your amplifier around a lot, we recommend a road case to protect it from scratches and road wear.

SETTING UP YOUR SOUND

Your amplifier is designed to sound about right with the tone controls set flat (5). We therefore recommend you start with the EQ set flat and the voicing filters out.

Helpful Hints

1. Don't be afraid to experiment with the EQ on your bass first. Make sure that you have as close to the sound you want from your bass before adjusting the EQ on your amp.
2. Set your playing level first. You may want to push up your volume and boost levels while dropping back the master. This will give a fatter sound but can add distortion. Some players find this desirable, you will have to be the judge. For the cleanest possible sound, operate the master on 10 (max). The boost control is footswitchable and can act as a pre-set volume. The L.E.D. next to the boost control indicates that boost is on.

SETTING UP YOUR SOUND CONT.

3. Once your basic levels are set, work with the voicing filters. The Lo Cut is a bass roll off and is used to control stage rumble at high volume. Mid Cut puts a notch at about 500hz giving a mellow round sound. Hi Boost adds edge and definition.
4. Having set your levels and filters, you are ready to fine tune your tone. This is an involved procedure requiring you to use your ears to tell you what is right. We have broken the sound spectrum into four basic bands and provided active controls for each. Adjustment procedures are repetitive and require patience.

TREBLE: Boost and cut at 4khz, will add or remove edge and definition.

HIGH MID: Boost and cut at 1khz. There is a lot of sound in this band, it works on the lower harmonics of your instrument and affects the punch of your sound.

LOW MID: Boost and cut at 250hz. Basically this band affects the body of your sound.

BASS: Boost and cut at 60hz. Affects only the bottom end and will be used to account for varying room accoustics.

SPECIFICATIONS

<u>Normal Gain</u>	
Sensitivity	2mv rms
Max Level	1V rms
Impedance	1M ohm
<u>-10dB Gain</u>	
Sensitivity	6mv rms
Max Level	3V rms
Impedance	1M ohm
<u>Effects Send</u>	
Level	1.5V rms (boost off)
Load Impedance	100k ohm min
<u>Effects Return</u>	
Level	1.5V rms (boost off)
Impedance	40k ohm
<u>Direct</u>	
Level	500mv rms
Impedance Min	600 ohm
<u>Speakers Max</u>	
8 ohm	2 max
4 ohm	1 max
<u>Power</u>	
8 ohm	125w
4 ohm	200w
<u>Boost Preset</u>	Switch to Ground
<u>Shipping Weight</u>	14 lbs.
<u>Dimensions</u>	3½" height x 17¼" width x 9" depth

400RB-200W Bass Amp

Turn on Procedure

Board #'s: 206-0047-C (preamp), 206-0041-A (power amp)

Model# 400RB all options

8-19-91

Setup

- 1) Variac on zero, power switch off- connect power cord.
- 2) Connect either output to load box (load A).
- 3) Resistance loads open (switch in center).
- 4) Speaker on.
- 5) Load box to scope-B and AC-VM.
- 6) Set scope switch on load box to look at load A (down).
- 7) Set oscillator on 200Hz sine wave @ 5mVrms (-46 dBV).
- 8) DVM on 20 mV (DC) range.
- 9) AC Voltmeter on 30V range.
- 10) Scope-B on 10V/cm.
- 11) Scope sweep on 1ms/cm, scope trigger on B on RB Front panel, set:
- 12) Tones, master and boost to 10, switches out.
- 13) Volume on 0.

Power Supply and Power Amp Test

- 1) With power switch on, gradually turn up variac to 50V, while listening to speaker and watching scope and ammeter. Output should go negative then snap back to 0.
- 2) Check regulated supplies: (+ or -)14.5V, + or - 1V.
- 3) Adjust variac to 120V and turn speaker off.
- 4) Set Bias. Adjust R14(on '41 board) for 5mV across R26, R27.
- 5) Power LED and boost LED should be lit.
- 6) Connect oscillator to input. (200Hz @ -46 dBV).
- 7) Turn on 4 ohm load.
- 8) Adjust volume for slight clipping(2-3 o'clock). Output = 28 Vrms.
- 9) Engage - 10dB switch- Output becomes 5.7 Vrms. Disengage switch.
- 10) Turn boost to 0. Output becomes 3 Vrms.
- 11) Turn master to 0. Output becomes 0V.
- 12) Turn load off.

Tones and Filter Test

- 1) Set all knobs to center (12 o'clock), switches out.
- 2) Set scope-B to 5V/cm and 1ms/cm.
- 3) Set oscillator to 200Hz square wave at -46 dBV.
- 4) Look at output, compare to figure 1.
- 5) One at a time, turn tone control knobs and compare output to figures(resetting to center after finishing):
 - A) Treble to 10- Fig.2; Treble to 0-Fig.3
 - B) Hi-mid to 10-Fig.4;Hi-mid to 0-Fig.5
 - C) Lo-mid to 10-Fig.6;Lo-mid to 0-Fig.7
 - D) Bass to 10-Fig.8; Bass to 0- Fig.9.
- 6) Engage low-cut switch, compare to Fig.10. Disengage.
- 7) Engage contour switch, compare to Fig. 11. Disengage.

- 2) Turn front panel knobs to 10, switches out.
- 3) Connect front speaker to output and listen to noise. It should be smooth, not crackling.
- 4) Change AC voltage range to 1V.
- 5) Noise should measure less than 400mV.
- 6) Engage low-cut, contour, and hi-boost. Noise < 400 mVrms.
- 7) Volume to 0. Noise < 100mVrms.
- 8) Boost to 0. Noise <10 mVrms.

Return knobs to zero, switches out- ready for burn-in.

400RB WAVEFORMS

200 Hz square wave @ -46dBV (5mVrms) input
All knobs to 12:00, switches out
Look at output with scope set on 1ms/div and 5V/div

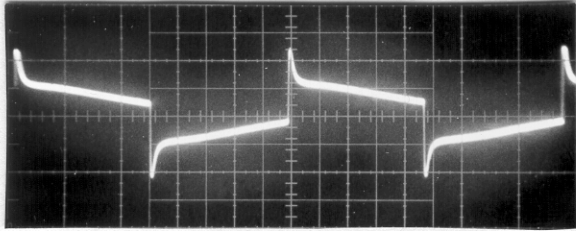


Fig. 1. Tones Center, Filters Off.

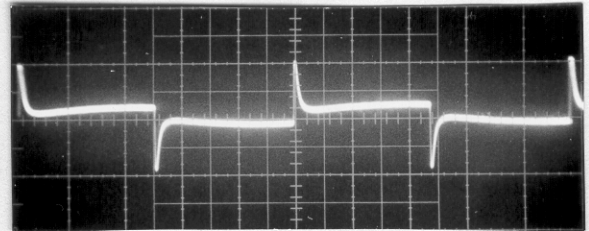


Fig. 7. Lo-Mid to 0.

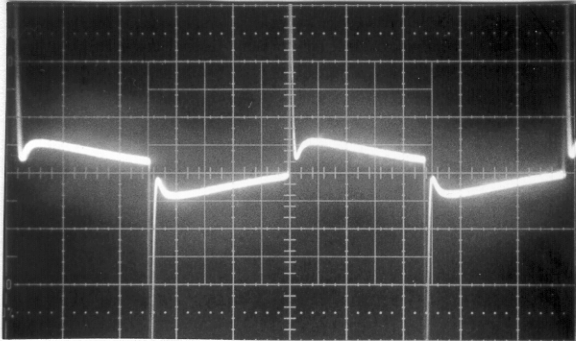


Fig. 2. Treble to 10.

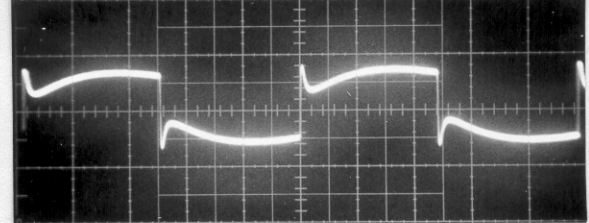


Fig. 8. Bass to 10.

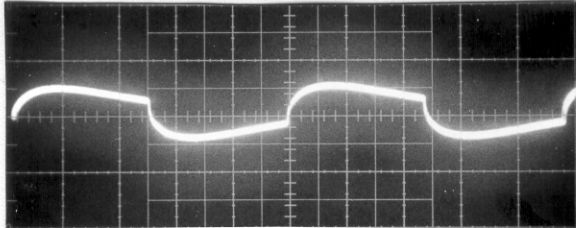


Fig. 3. Treble to 0.

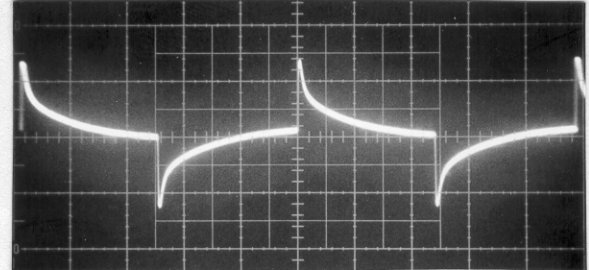


Fig. 9. Bass to 0.

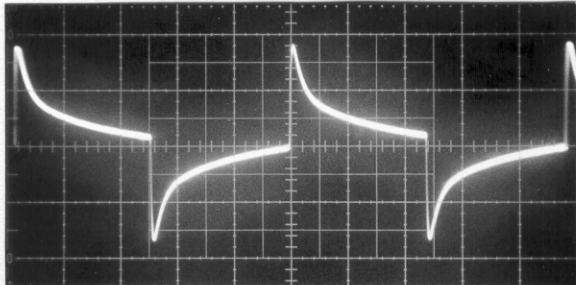


Fig. 4. Hi-Mid to 10.

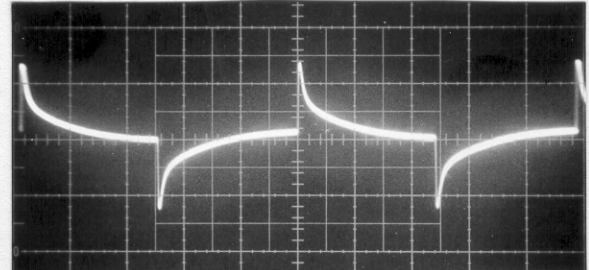


Fig. 10. Lo-Cut in.

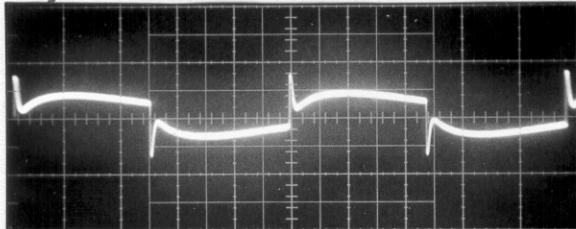


Fig. 5. Hi-Mid to 0.

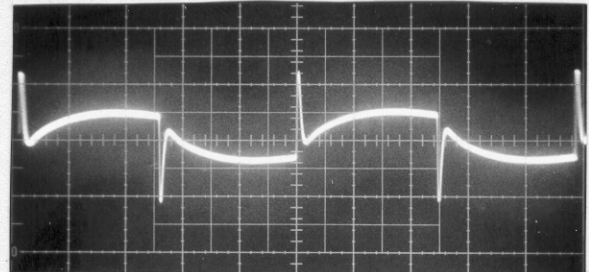


Fig. 11. Contour in.

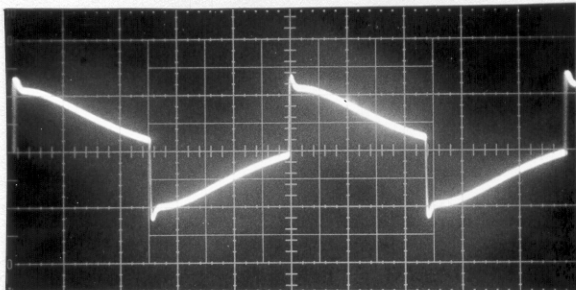


Fig. 6. Lo-Mid to 10.

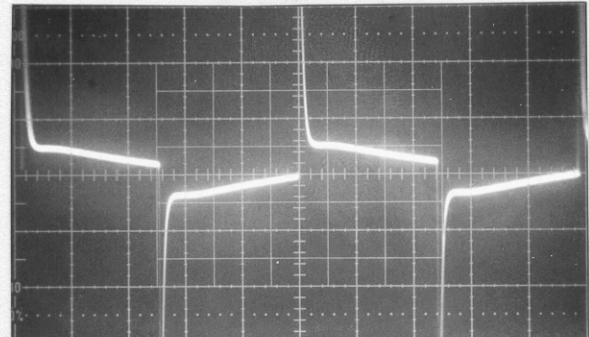
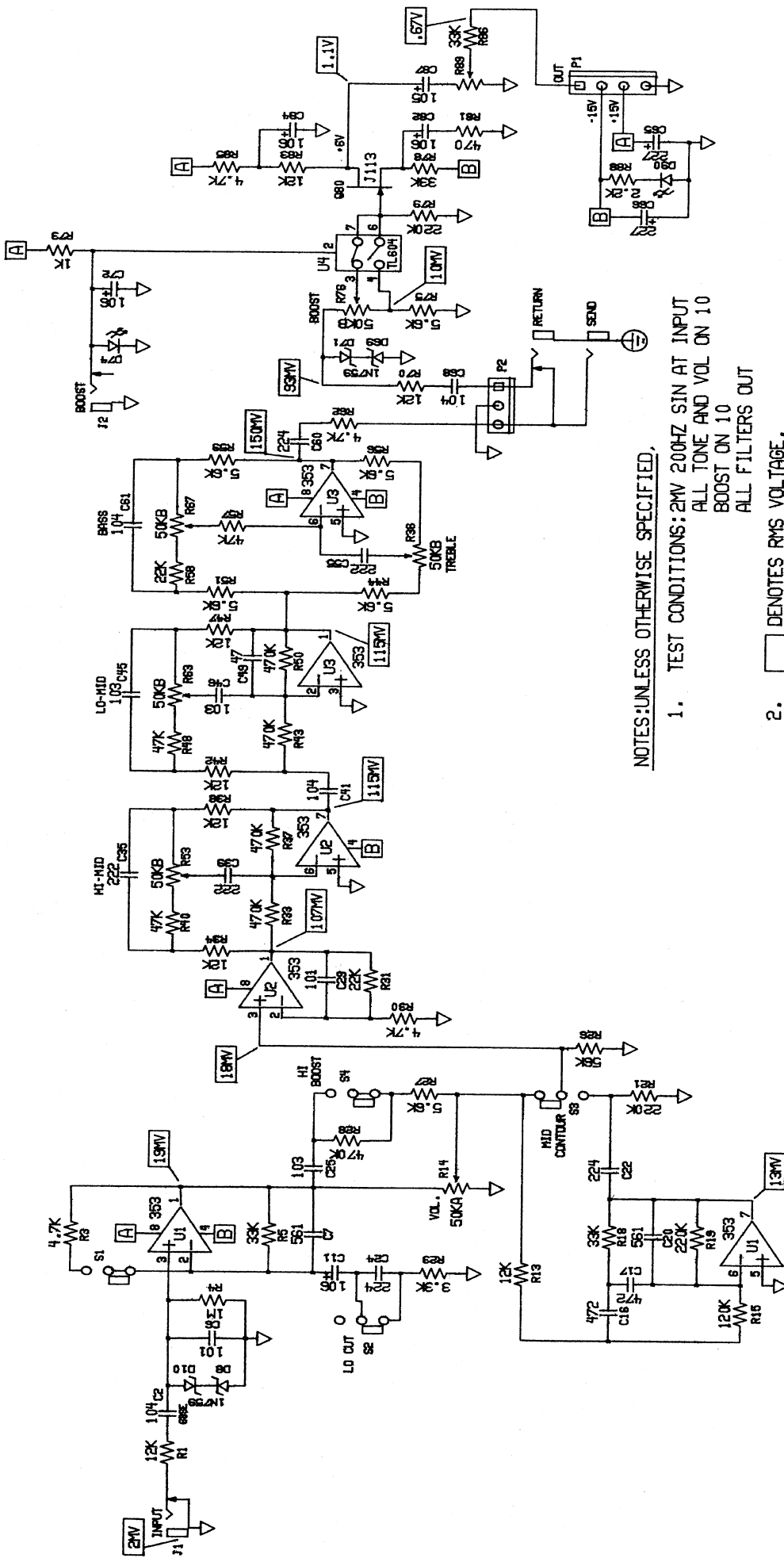


Fig. 12. High Boost in.

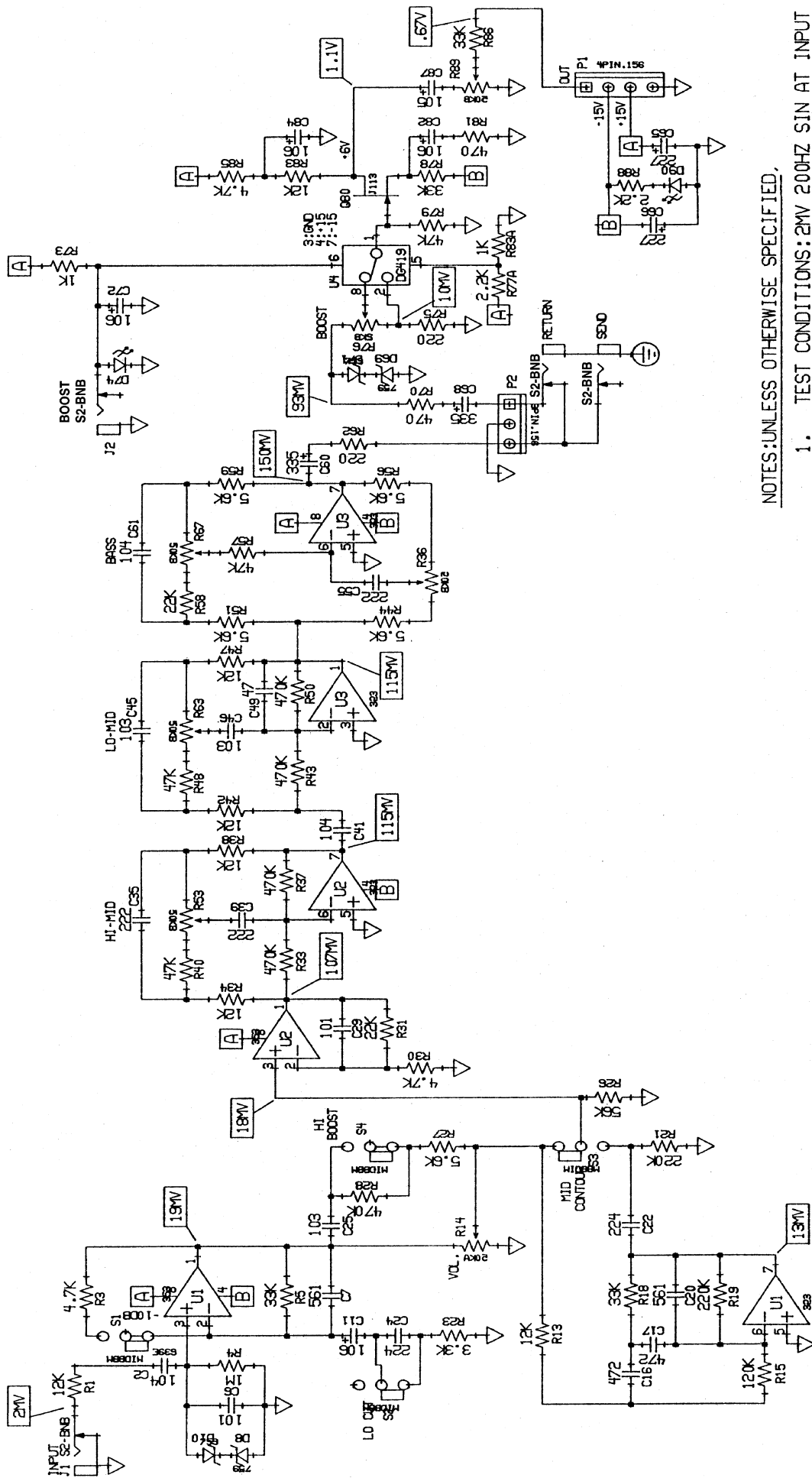


NOTES: UNLESS OTHERWISE SPECIFIED,

1. TEST CONDITIONS: 2mV 200HZ SIN AT INPUT
ALL TONE AND VOL ON 10
BOOST ON 10
ALL FILTERS OUT
2. □ DENOTES RMS VOLTAGE.

CD#	DATE	FIRST SN	PCD#	DATE	FIRST SN	PCO#	DATE	FIRST SN

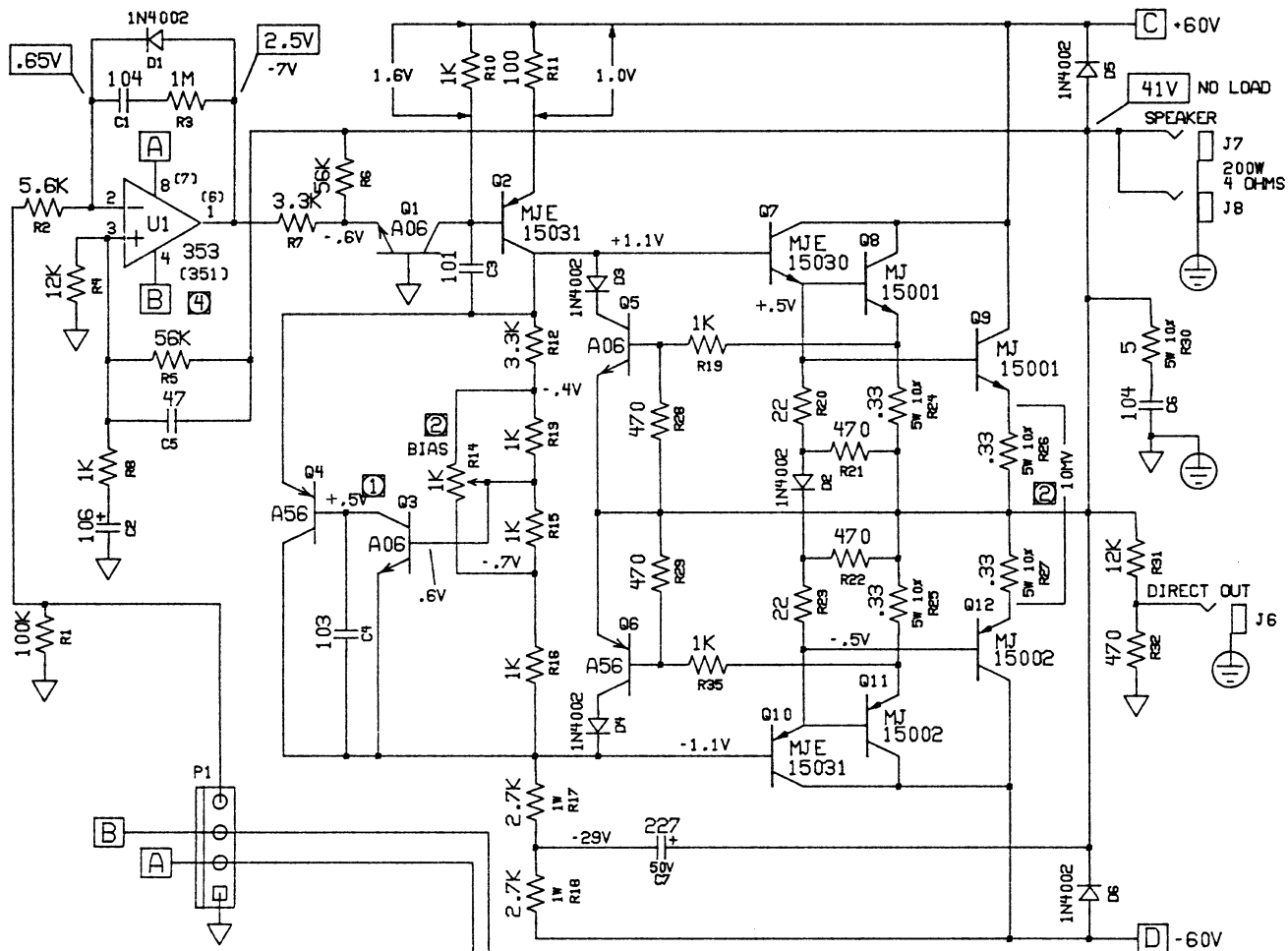
GALLIEN-KRUEGER		MODEL #:	DATE:	DESCRIPTION:
		400RB	8/13/91	NEW 400RB PREAMP
SCHEMATIC	DBF:	DESIGNED BY:	PART #:	PCD#-DATE:
PG: 1 OF: 1	60047C	MPJ/RAG	406-0047-C	FROM SN: TO SN



NOTES: UNLESS OTHERWISE SPECIFIED,

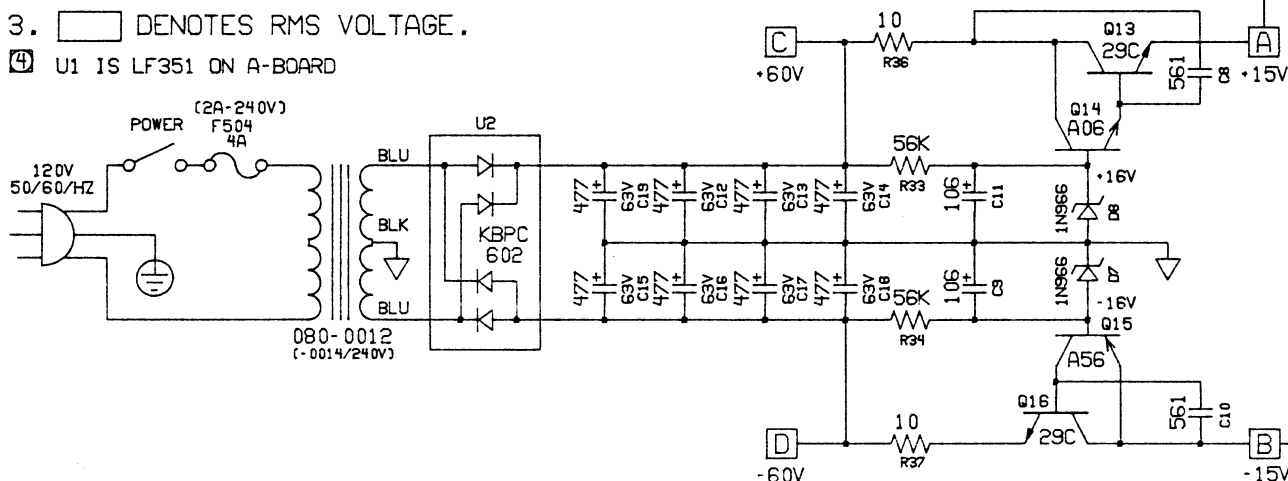
1. TEST CONDITIONS: 2MV 200HZ SIN AT INPUT
ALL TONE AND VOL ON 10
BOOST ON 10
ALL FILTERS OUT
2. DENOTES RMS VOLTAGE.

PCO#	DATE	DESCRIPTION:
		GALLIEN TECHNOLOGY 408-441-8081
		2240 PARAGON, SAN JOSE, CA 95131
		MODEL #: 400RB
		DATE: 5/25/95
		DESCRIPTION: NEW 400RB PREAMP
		DESIGNED BY: MPJ/RAG
		DBF: 60047D
		PG: 1 OF: 1
		REV#-DATE: 406-0047-D/E
		FOR: (COMPANY)
		GALLIEN-KRUEGER



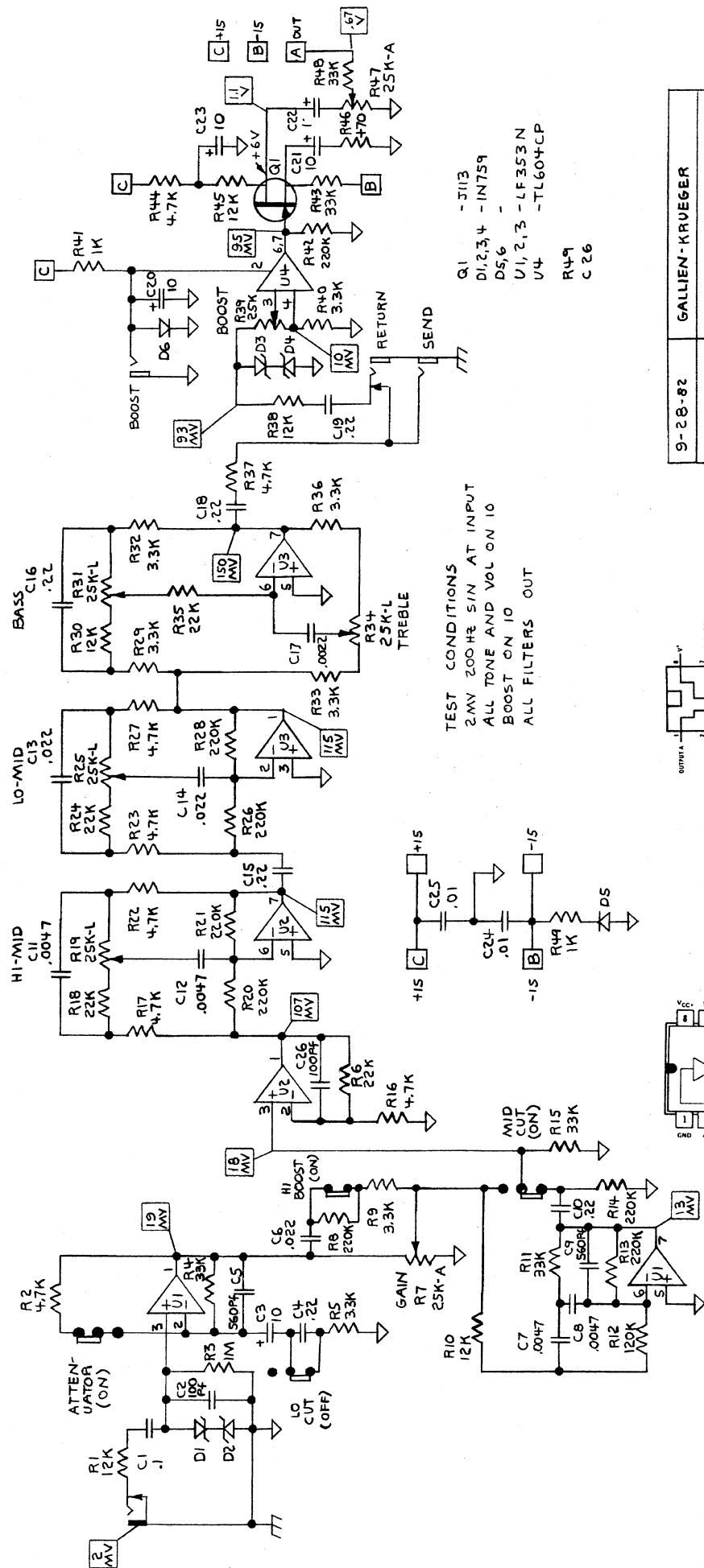
NOTES: UNLESS OTHERWISE SPECIFIED,

- ① Q3 MOUNTED ON HEATSINK
- ② ADJUST BIAS FOR 5MV ACROSS EACH, R26 AND R27
- 3. DENOTES RMS VOLTAGE.
- ④ U1 IS LF351 ON A-BOARD



GK DOCUMENT #:	PCO#	DATE							
406-0041-C									
GALLIEN-KRUEGER		MODEL #:	DATE:	DESCRIPTION:					
		400RB	4/1/92	POWER AMP, POWER SUPPLY					
SCHMATIC	DBF:	DESIGNED BY:	PART #:	PCO#-DATE:	FROM SN:	TO SN:			
PG: 1 OF: 1	60041C	R.A.G.	0041A, 0041C	-					

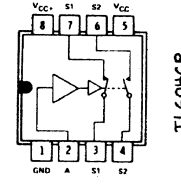
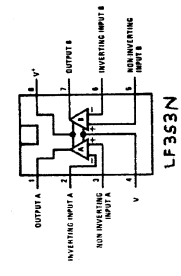
603.0004.3.10



TEST CONDITIONS
 2MV 200HZ SIN AT INPUT
 ALL TONE AND VOL ON 10
 BOOST ON 10
 ALL FILTERS OUT

G1 - J113
 D1,2,3,4 - 1N759
 D5,6 -
 U1,2,3 - LF353N
 U4 - TL604CP
 R49
 C26

9-28-82	GALLIEN-KRUEGER
BOB GALLIEN	400RB PREAMP
SN-012899	60047A

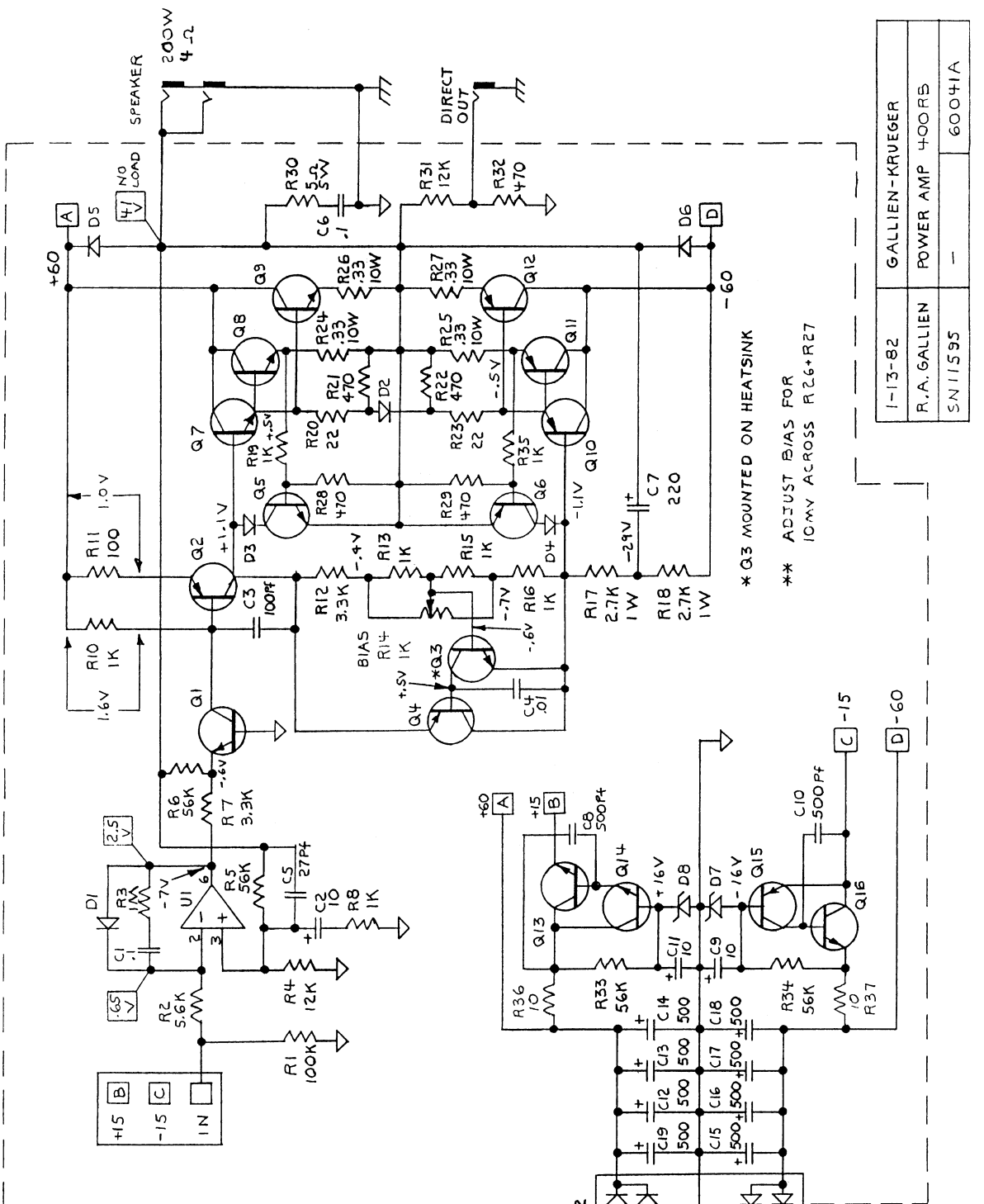


Q1, 3, 5, 14 MPS-A06
 Q2, 10 MJE-15031
 Q4, 6, 15 MPS-A56
 Q7 MJE-15030
 Q8, 9 M3-15001
 Q11, 12 M3-15002
 Q13, 16 TIP-31B

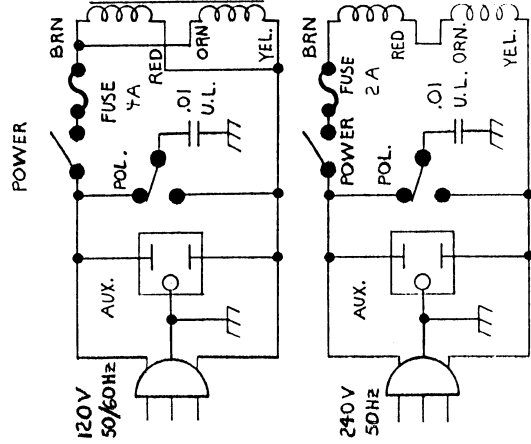
U1 LF351N
 U2 KBCFC-602

D1, 2, 3, 4, 5, 6-IN4002
 D7, 8 IN966

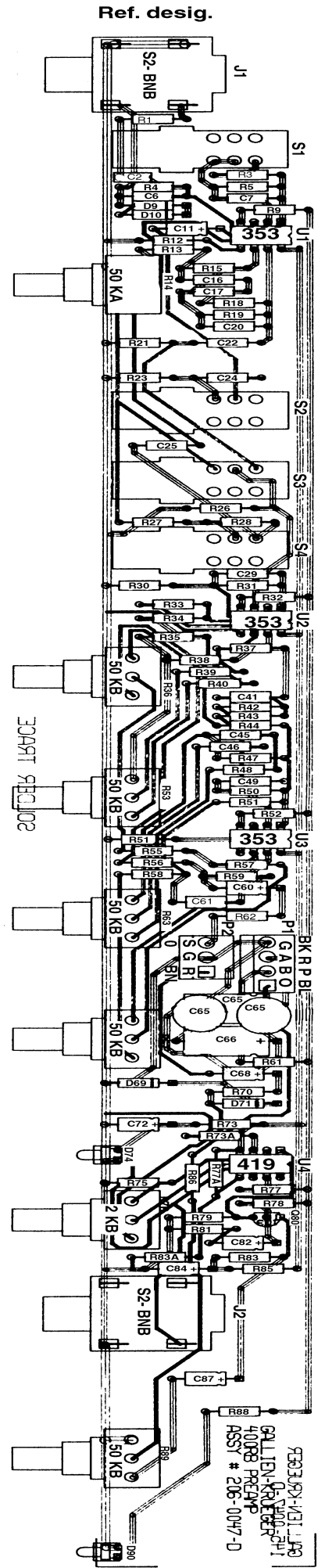
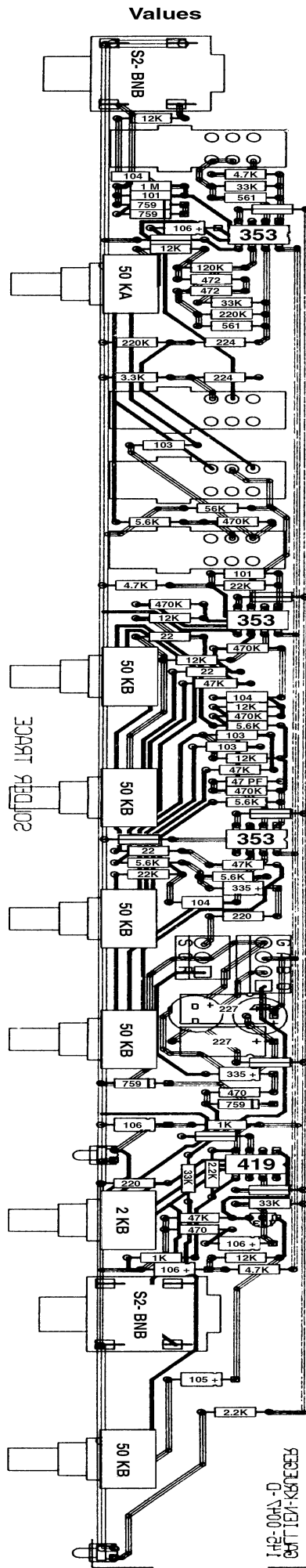
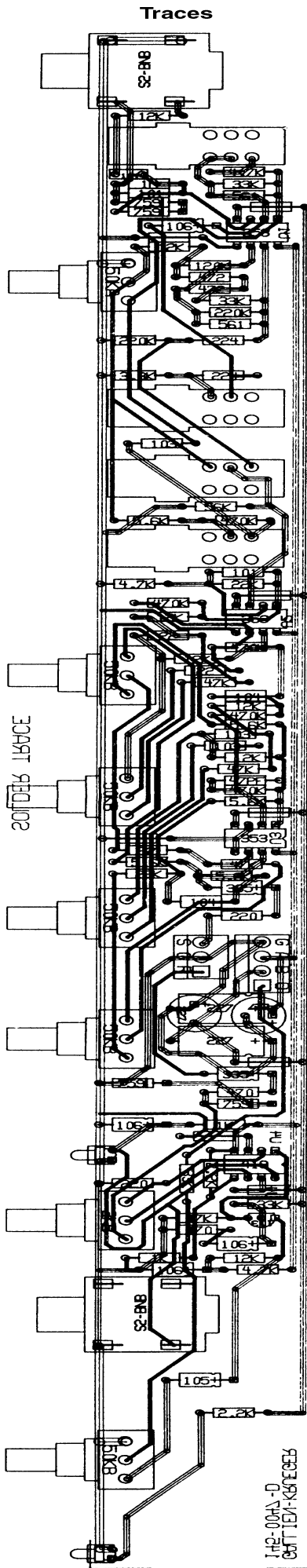
R-37
 C19



* Q3 MOUNTED ON HEATSINK
 ** ADJUST BIAS FOR 10MV ACROSS R26+R27

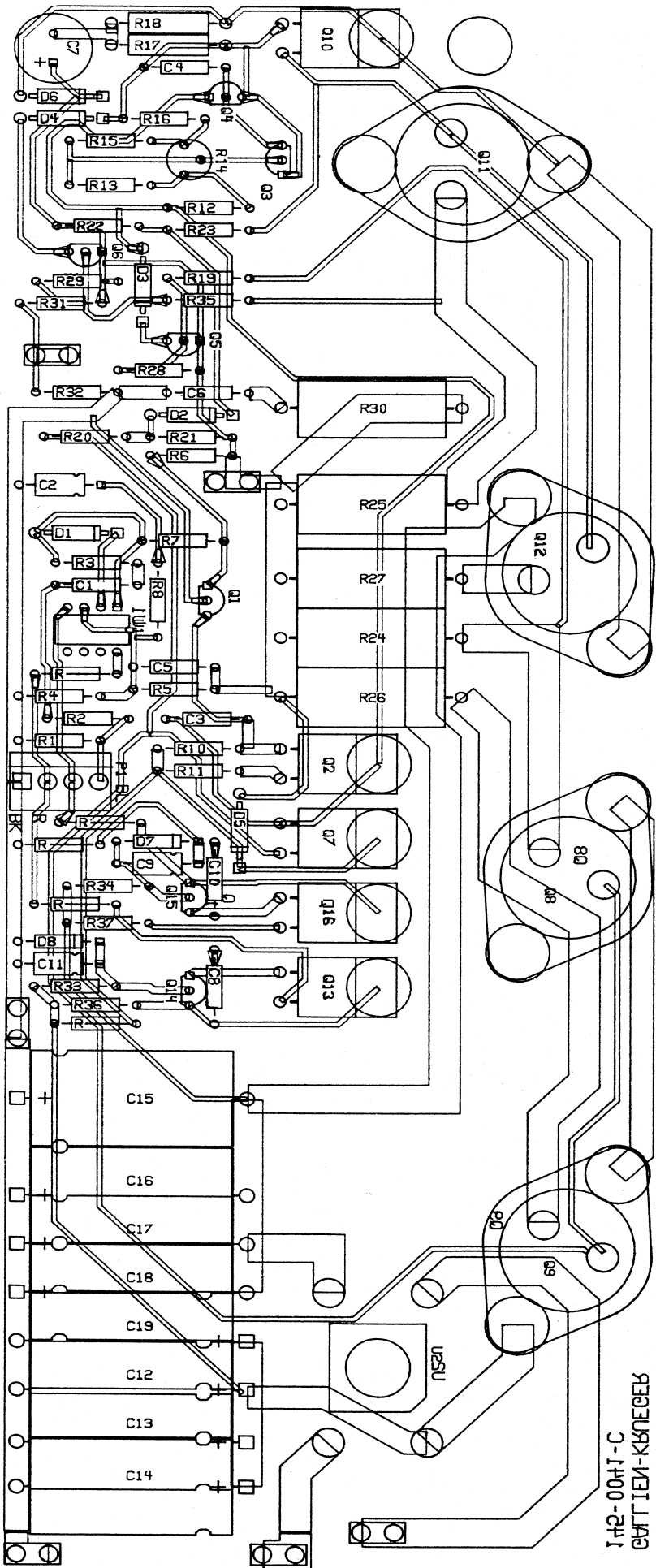


I-13-82	GALLIEN-KRUEGER
R.A. GALLIEN	POWER AMP 400RS
SN11595	60041A



COMPONENT SIDE SHOWN

GALLIEN TECHNOLOGY 408-441-8081		MODEL #:	DATE:	DESCRIPTION:
2240 PAPERON, SAN JOSE, CA 95131		400RB	2/14/95	NEW 400RB PREAMP BOARD
CIRCUIT BOARD	DBF:	DESIGNED BY:	BOARD #:	REV#-DATE:
ARTWORK	50047D	MPJ/RAG	145-0047-D	-
				GALLIEN-KRUEGER

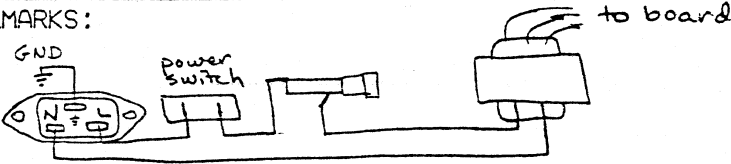


REEJULI-KRUEGER
 403-0041-C

403-0041 REV C
 GALLIEN-KRUEGER

PCO#	DATE

GALLIEN-KRUEGER		MODEL #:	400RB	DATE:	3/26/92	DESCRIPTION:	POWER AMP/SUPPLY BOARD
CIRCUIT BOARD	DBF:	DESIGNED BY:	R.A.G.	BOARD #:	206-0041-C	REV#-DATE:	FROM SN: TO SN:
ARTWORK	50041C						

GALLIEN-KRUEGER		PRODUCTION CHANGE ORDER		PCO#: <u>400RB: 7</u> <u>800RB: 11</u>			
DATE: <u>2/1/93</u>		ASSEMBLY #: <u>302-0050 / 302-0060</u>		MODEL#: <u>400RB/800RB</u>			
ASSEMBLY DESCRIPTION: <u>400RB/800RB Main Assembly</u>				PAGE <u>1</u> OF <u>1</u>			
AFFECTS OPTIONS: <input checked="" type="checkbox"/> ALL <input type="checkbox"/> 100V <input type="checkbox"/> 120V <input type="checkbox"/> 220V <input type="checkbox"/> 240V <input type="checkbox"/> 50HZ <input type="checkbox"/> 60HZ							
TYPE OF CHANGE: <input type="checkbox"/> NECESSARY TO THE FUNCTION OF THE UNIT <input type="checkbox"/> IMPROVEMENT OR ADDITION TO THE UNIT <input checked="" type="checkbox"/> OTHER <u>Done for CSA Approval</u>							
CHANGE TO BE IMPLEMENTED TO: <input checked="" type="checkbox"/> NEXT PRODUCTION RUN <input type="checkbox"/> ALL UNITS IN PRODUCTION <input type="checkbox"/> ALL UNITS IN STOCK <input type="checkbox"/> ALL UNITS BEING SERVICED <input type="checkbox"/> OTHER _____			REMARKS: 				
BEGINNING SERIAL NUMBER AFFECTED: _____							
DESCRIPTION OF CHANGE: <input type="checkbox"/> SEE PCO SUPPLEMENTS <input type="checkbox"/> CONTINUED ON PCO SUPPLEMENT PAGE _____ <p>When wiring up power supply, wire from "L" terminal of AC receptical to the power switch. Then wire from the power switch to the end lug of the fuse holder. Then from the other lug of the fuse holder to the transformer. The wire from the "N" terminal goes directly to the transformer.</p>							
REASON FOR CHANGE: <u>CSA requires these changes for approval.</u>							
PARTS ADDED			PARTS DELETED				
PART#	DESCRIPTION	QTY.	REF. DES.	PART#	DESCRIPTION	QTY.	REF. DES.
<input type="checkbox"/> CONTINUED ON PAGE _____			<input type="checkbox"/> CONTINUED ON PAGE _____				
AFFECTED AREAS	DONE BY	DATE	AFFECTED AREAS (CONT)	DONE BY	DATE		
<input type="checkbox"/> CIRCUIT SCHEMATIC			<input type="checkbox"/>				
<input type="checkbox"/> BILL OF MATERIAL			<input type="checkbox"/>				
<input type="checkbox"/> AUTO INSERTER			<input type="checkbox"/>				
<input checked="" type="checkbox"/> SAMPLE CHANGE			DOCUMENT DIST. LIST	# COPIES			
<input type="checkbox"/> TEST PROCEDURE			<input type="checkbox"/> GK USA				
<input type="checkbox"/> COMP. CONTROL FORM			<input type="checkbox"/> SERVICE CENTERS				
<input type="checkbox"/> FAB DRAWING			<input type="checkbox"/> GK EUROPE				
<input type="checkbox"/> PUNCH PROGRAM			<input type="checkbox"/> GK CAMPBELL				
<input type="checkbox"/> PUNCH SAMPLE			<input type="checkbox"/> ENGINEERING				
<input type="checkbox"/> ASSEMBLY PROCEDURES			<input type="checkbox"/> FABRICATION				
<input type="checkbox"/> ARTWORK			<input type="checkbox"/> PRODUCTION				
<input type="checkbox"/> SILKSCREEN TEMPLATE			<input type="checkbox"/> OUTSIDE SUPPLIERS				
<input type="checkbox"/>			<input type="checkbox"/>				
DRAWING(S) SHOWING MODIFICATION ATTACHED: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES - SPECIFY:							
WRITTEN BY: <u>Michael Johns</u>		DEPT: <u>Eng</u>		DATE: <u>2/1/93</u>			
REVIEWED/APPROVED BY: _____		DEPT: _____		DATE: _____			

PCOFORM

GALLIEN TECHNOLOGY

Tel: (408) 441-8081

Fax: (408) 441-8085

2240 Paragon Dr., San Jose, CA 95131

ECO#

11

ENGINEERING CHANGE ORDER

MODEL:

400RB

CUSTOMER Gallien Krueger

LEVEL: System

DATE: 2/14/95

DESC. 400RB preamp

Board

ORIGINATOR: M Johns

ASSY# 206-0047- (145-0047) REV# C4 → D

Fab

EFFECTIVE

PENDING

APPROVAL

INITIAL

DATE

Next production Run

All in Process

All in Stock

All being Serviced

Others: when order is placed for new boards

Pending/Reject Reason:

Type of Change: Necessary

Improvement

Other:

Engineering

MJ 2/14/95

Material

Production

Fabrication

Marketing

Cost accounting

REASON FOR CHANGE:

To replace TL 604 w/ Siliconix DG419

AFFECTED AREA:

Schematic

Artwork

Bill of Material

Comp. Control Form

Assembly Drawing

Test Procedure

Fab Drawing

Silkscreen

Punch Program

Continued on ECO supplement page _____

DESCRIPTION OF CHANGE:

Board is re-layed out to accomodate DG419 instead of TL604. Rev # goes from C4 to D.

Continued on ECO supplement page _____

TOTAL PARTS ADDED:

TOTAL PARTS DELETED:

PART#	DESCRIPTION	QTY	REF.DES.	PART#	DESCRIPTION	QTY	REF.DES.
	335 cap	2	C60, C68		224 cap	1	C60
	220R res	2	R62, R75		4.7K res	1	R62
	470R res	1	R70		104 cap	1	C68
	2KB pot	1	R76		12K res	1	R70
	47K res	1	R79		50KB pot	1	R76

DISTRIBUTION:

Engineering

Material

Production

Fabrication

Others: _____

over →

FORM#: REV A

12/7/93

GALLIEN TECHNOLOGY 2240 Paragon Dr., San Jose, CA 95131 Tel: (408) 441-8081 Fax: (408) 441-8085	ECO# <i>11</i>
ECO SUPPLEMENT	

CUSTOMER _____ DESC. _____ ASSY# _____ REV# _____	LEVEL : <input type="checkbox"/> System <input type="checkbox"/> Board <input type="checkbox"/> Fab	DATE: _____ ORIGINATOR: _____
---	--	--

REASON FOR CHANGE: (Continued from Page:)

Continued on ECO supplement page _____

DESCRIPTION OF CHANGE: (Continued from Page:)

Continued on ECO supplement page _____

TOTAL PARTS ADDED:				TOTAL PARTS DELETED:			
PART#	DESCRIPTION	QTY	REF.DES.	PART#	DESCRIPTION	QTY	REF.DES.
	<i>2.2K res</i>	<i>1</i>	<i>R77A</i>		<i>5.6K res</i>	<i>1</i>	<i>R75</i>
	<i>1K res</i>	<i>1</i>	<i>R83A</i>		<i>220K res</i>	<i>1</i>	<i>R79</i>
	<i>DG419</i>	<i>1</i>	<i>U4</i>		<i>TL604</i>	<i>1</i>	<i>U4</i>

ENGINEERING CHANGE ORDER

CUSTOMER Gallien Kruger

LEVEL: System

DATE: 11/6/95

DESC. 400RB preamp board

Board

ORIGINATOR: m johns

ASSY# 206-0047-D

REV# D

Fab

EFFECTIVE

PENDING

APPROVAL

INITIAL

DATE

Next production Run

All in Process

All in Stock

All being Serviced

Others: Until old boards and front panels are used up.

Pending/Reject Reason:

Type of Change: Necessary

Improvement

Other:

Engineering

mg 11/6/95

Material

Production

Fabrication

Marketing

RK (mg) 11/6/95

Cost accounting

REASON FOR CHANGE:

Since we can't get the 2KB pot in time, we will use a 50KB pot instead. That requires some other components to change as well. This is only temporary and values will go back to original when 2KB's are again used on the Rev D16 boards (this undoes some of ECO #11's changes)

Continued on ECO supplement page _____

AFFECTED AREA:

Schematic

Artwork

Bill of Material

Comp. Control Form

Assembly Drawing

Test Procedure

Fab Drawing

Silkscreen

Punch Program

DESCRIPTION OF CHANGE:

- 1) Change C60 from 335 to 224.
- 2) Change R62 from 220R to 4.7K.
- 3) Change C68 from 335 to 104.
- 4) Change R70 from 470R to 12K.
- 5) Change R76 from 2KB pot to 50KB pot
- 6) Change R75 from 220R to 5.6K
- 7) Change R79 from 47K to 220K.

Continued on ECO supplement page _____

TOTAL PARTS ADDED:

TOTAL PARTS DELETED:

PART#	DESCRIPTION	QTY	REF.DES.	PART#	DESCRIPTION	QTY	REF.DES.
	224 cap	1	C60		335 cap	2	C60, C68
	4.7K res	1	R62		220R res	2	R62, R75
	104 cap	1	C68		470R res	1	R70
	12K res	1	R70		2KB pot	1	R76
	50KB pot	1	R76		47K res	1	R79
	5.6K res	1	R75				
	220K res	1	R79				

DISTRIBUTION:

Engineering

Material

Production

Fabrication

Others: _____

GALLIEN TECHNOLOGY

Tel: (408) 441-8081
Fax: (408) 441-8085

2240 Paragon Dr., San Jose, CA 95131

ECO#

19

ENGINEERING CHANGE ORDER

MODEL:

400RB

CUSTOMER: Gallien Krueger
DESC: 400RB pump board
ASSY#: 145-2047-D, 206-0047-D REV# D → E

LEVEL: System
 Board
 Fab

DATE: 4/19/96
ORIGINATOR: mjohns

- EFFECTIVE
- Next production Run
 - All in Process
 - All in Stock
 - All being Serviced
 - Others:

PENDING

Pending/Reject Reason:

Type of Change: Necessary
 Improvement
 Other:

APPROVAL	INITIAL	DATE
Engineering	<u>mj</u>	<u>4/19/96</u>
Material		
Production		
Fabrication		
Marketing		
Cost accounting		

REASON FOR CHANGE:
Use new pots, 7mm bushing instead of 9mm.

Continued on ECO supplement page _____

- AFFECTED AREA:
- Schematic
 - Artwork
 - Bill of Material
 - Comp. Control Form
 - Assembly Drawing
 - Test Procedure
 - Fab Drawing
see ECO#18
 - Silkscreen
 - Punch Program

DESCRIPTION OF CHANGE:

- 1) All pots change from 9mm version to 7mm versions.
- 2) Moves R58 and R44 on layout.
- 3) Adds 2 jumpers (or) at R75A, R76A

Continued on ECO supplement page _____

TOTAL PARTS ADDED:				TOTAL PARTS DELETED:			
PART#	DESCRIPTION	QTY	REF.DES.	PART#	DESCRIPTION	QTY	REF.DES.
052-0000-0	052 res	2	R75A, R76A	010-0513-0	50KA pot 9mm	1	R14
070-1513-0	50KA pot 7mm	1	R14	070-0514-0	50KB pot 9mm	1	R36, 53, 63, 67, 89
070-1514-0	50KB pot 7mm	5	R36, 53, 63, 67, 89	070-0522-0	2KB pot 9mm	1	R76
070-1522-0	2KB pot 7mm	1	R76				

DISTRIBUTION: Engineering Material Production Fabrication Others:

FORM#: REV A

12/7/93

6/22/99

400RB-II**INDENTED BILL OF MATERIALS**

Main assembly numbers are in bold face.

Most commonly needed parts are italicized.

*-Level 1 refers to main asy

Level 2 refers to board pts.

LVL.*	PART#	DESCRIPTION	QTY	REF.DESIG.
1	010-0012-0	MPSA06 NPN 80V 500MA TO-92	1	
1	011-0002-0	TIP31C NPN 80V 3A TO-220	2	
1	011-0007-0	MJE15030 NPN 150V 8A TO-220	1	
1	011-1008-0	MJE15031 PNP 150V 8A TO-220	2	
1	013-0018-0	MJ-15001 NPN 140V 15A TO-3	2	
1	013-1019-0	MJ-15002 PNP 140V 15A TO-3	2	
1	023-0108-0	KBPC-602 BRIDGE RECT,6A,200V,C216A	1	
1	056-.330-0	RES,CERAMIC WW,.33 OHM,5W,10%	4	
1	056-0500-0	RES,CERAMIC WW,5 OHM,5W,10%	1	
1	<i>080-0012-0</i>	<i>TRANSFORMER,200W,120V,Z=4</i>	1	
1	090-0008-0	SWITCH,ROCKER,SPST,4A,QUICK-TERM	1	
1	<i>091-0005-0</i>	<i>FUSE, 5A,125V,1/4X1 1/4,SLB</i>	1	
1	092-0002-0	JACK SW-11,1/4",O-TIP,SLDR TERM	3	
1	092-0004-0	JACK SW-L11,1/4",O-TIP,SLDR TERM,LONG	1	
1	092-0011-0	JACK SW-L12A,1/4",S-TIP,LONG	1	
1	092-0064-0	Q-CON, .25 TAB,18-22GA,INSULATED	16	
1	<i>093-0014-0</i>	<i>RECEPTACLE AC,Q-TERM</i>	1	
1	093-0032-0	HOUSING,3X.156,FEMALE 22GA,LOCK	1	
1	093-0035-0	HOUSING,4X.156,FEMALE 22GA,LOCK	2	
1	094-0013-0	HOLDER,FUSE,1/4 X 1 1/4,Q-TERM	1	
1	094-0020-0	SOLDER LUG,#10	2	
1	<i>095-0005-0</i>	<i>POWER CORD,117V PLUG,DETACH</i>	1	
1	100-0000-0	INSULATOR,MICA,56-03-2AP,TO3	4	

LVL.	PART #	DESCRIPTION	QTY	REF.DESIG.
1	100-0020-0	BUMPER,ROUND RUBBER,1/2"X.14"	4	
1	100-0030-0	BUTTON,RECT BLACK CAP - PUSH SWITCH	4	
1	100-0031-0	WASHER,#4,RECT,TO-220 MGT	5	
1	100-0032-0	INSULATOR,MICA,56-77-11AP,TO-220	5	
1	100-0033-0	CABLE TIE - PLT 1M-M,SMALL	1	
1	100-0037-0	HEAT CLIP,TO-98	1	
1	100-0041-0	WIRE HOLDER N-4	1	
1	100-0042-0	HANDLE,RUBBER,6.5"	1	
1	100-0076-0	FOOT,RUBBER,ROUND,5/8DIA. X 5/8"	4	
1	100-0102-0	CAP,.72 APLS SPLINE SHAFT	7	
1	100-0103-0	KNOB,.72 APLS SPLINE SHAFT	7	
1	112-0081-0	BOLT 6-32 1/2 PHP CAD	1	
1	112-0101-0	BOLT 6-32 5/8 PHP CAD	13	
1	112-0121-0	BOLT 6-32 3/4 PHP CAD	1	
1	112-4081-0	SCREW 6AB 1/2 FHP 82^ CAD	4	
1	112-6001-0	NUT 6-32 KEP LARG SIZE CAD	15	
1	112-8060-0	TR-BOLT 6-32 3/8 PHP B.O.	2	
1	112-9060-0	TR-BOLT 6-32 3/8 FHP B.O.	24	
1	112-9101-0	TR-BOLT 6-32 5/8 FHP CAD	2	
1	114-0080-0	BOLT 10-32 1/2 PHP B.O.	10	
1	114-1060-0	BOLT 10-32 3/8 FHP 82^ B.O.	4	
1	114-6001-0	NUT 10-32 KEP CAD	4	
1	115-7005-0	WASHER 3/8 FIBRE FLAT	2	
1	115-7021-0	WASHER 3/8 INTERNAL CAD	11	
1	130-0022-A	200W HEAT SINK	1	

LVL.	PART#	DESCRIPTION	QTY.	REF. DESIG.
1	130-0063-0	400RB FRONT PANEL OVERLAY	1	
1	130-0064-0	400RB REAR PANEL OVERLAY	1	
1	132-0314-E	400RB-II REAR PANEL	1	
2	120-0005-0	ALUM .100	102	
1	132-0317-A	400RB,200W UPPER SINK	1	
2	120-0006-0	ALUM .125	44	
1	132-0318-A	400RB,200W LOWER SINK	1	
2	120-0006-0	ALUM .125	44	
1	132-0565-0	400RB-II FRONT PANEL	1	
2	114-6056-0	NUT 10-32 PRESS FOR STEEL	4	
2	120-0011-0	STEEL,18 GAUGE JET COAT,.048	114	
1	132-0567-0	400RB-II RIGHT SIDE	1	
2	120-0005-0	ALUM .100	49	
1	132-0568-0	400RB-II LEFT SIDE	1	
2	120-0005-0	ALUM .100	49	
1	132-0569-0	400RB-II COVER	2	
2	120-0005-0	ALUM .100	320	
1	132-0575-0	400RB-II RACK EAR	2	
2	120-0005-0	ALUM .100	21	
1	150-0012-0	BOX,400-800	1	
1	150-0013-0	END CAP,400RB	2	
1	160-0002-0	MANUAL,400RB	1	

206-0041-C 400RB Power Amp

LVL.	PART#	DESCRIPTION	QTY	REF. DESIG.
2	001-1030-0	LF353N DUAL JFET OP AMP	1	U1
2	010-0012-0	MPSA06 NPN 80V 500MA TO-92	3	Q1,Q5,Q14
2	010-1013-0	MPSA56 PNP 80V 500MA TO-92	3	Q4,Q6,Q15
2	020-0160-0	1N966B,ZENER,16V,5%,400MW,DO-35	2	D7,D8
2	020-2105-0	1N4002,RECT,1A,150V,DO-41	6	D1,D2,D3,D4,D5,D6
2	030-2101-0	CAP,CER,AX,101,10%,50V,NPO	1	C3

2	030-2103-0	CAP,CER,AX,103,10%,50V,X7R	1	C4
2	030-2104-0	CAP,CER,AX,104,10%,50V,X7R	2	C1,C6
2	030-2470-0	CAP,CER AXIAL,47 PF,10%,50V,NPO	1	C5
2	030-2561-0	CAP,CER AXIAL,561,10%,50V,X7R	2	C8,C10
2	031-2227-0	CAP,ELEC,RAD,227,-10%+50%,50V	1	C7
2	038-0106-0	CAP,ELEC,AXIAL TR,106,20%,16V	3	C2,C9,C11
2	038-3477-0	CAP,ELEC AXIAL,477,-10%+50%,63V	8	C12,C13,C14,C15,C16,C17,C18,C19
2	051-0101-0	RES,CARBON FILM,10 OHM,1/4W,5%	2	R36,R37
2	051-0221-0	RES,CARBON FILM,22 OHM,1/4W,5%	2	R20,R23
2	051-1001-0	RES,CARBON FILM,100 OHM,1/4W,5%	1	R11
2	051-1002-0	RES,CARBON FILM,1K OHM,1/4W,5%	7	R8,R10,R13,R15,R16,R19,R35
2	051-1004-0	RES,CARBON FILM,100K OHM,1/4W,5%	1	R1
2	051-1005-0	RES,CARBON FILM,1M OHM,1/4W,5%	1	R3
2	051-1203-0	RES,CARBON FILM,12K OHM,1/4W,5%	2	R4,R31
2	051-3302-0	RES,CARBON FILM,3.3K OHM,1/4W,5%	2	R7,R12
2	051-4701-0	RES,CARBON FILM,470 OHM,1/4W,5%	5	R21,R22,R28,R29,R32
2	051-5602-0	RES,CARBON FILM,5.6K OHM,1/4W,5%	1	R2
2	051-5603-0	RES,CARBON FILM,56K OHM,1/4W,5%	4	R5,R6,R33,R34
2	052-0000-0	RES,CARBON FILM 0 OHM,1/4W,5%	5	
2	054-2702-0	RES,CARBON FILM,2.7K OHM,1W,5%	2	R17,R18
2	070-0508-0	POT,1K TRIM,6MM,SLOT,.3W	1	R14
2	092-0066-0	FASTON,M,PC,.250"	6	P2,3,4,5,6,7
2	093-0029-0	HDR,.156X4,VERT,MALE,LOCK,ROUND	1	P1
2	145-0041-C	400RB POWER AMP BOARD	1	

206-0047-E 400RB Preamp

LVL	PART#	DESCRIPTION	QTY	REF. DESIG.
2	001-1030-0	LF353N DUAL JFET OP AMP	3	U1,U2,U3
2	001-3029-0	DG419DJ, DUAL COMP ANALOG SWITCH	1	U4
2	010-2010-0	J113 N-JFET 35V 2MA TO-92	1	Q80
2	020-0120-0	1N759A,ZENER,12V,5%,400MW,DO-35	4	D8,D10,D69,D71
2	030-2101-0	CAP,CER,AX,101,10%,50V,NPO	2	C6,C29
2	030-2103-0	CAP,CER,AX,103,10%,50V,X7R	3	
2	030-2104-0	CAP,CER,AX,104,10%,50V,X7R	2	C41,C61
2	030-2222-0	CAP,CER,AX,222,10%,50V,X7R	3	C35,C39,C55
2	030-2224-0	CAP,CER AXIAL,224,20%,50V,Z5U	2	C22,C24
2	030-2470-0	CAP,CER AXIAL,47 PF,10%,50V,NPO	1	C49
2	030-2472-0	CAP,CER AXIAL,472,10%,50V,X7R	2	C16,C17
2	030-2561-0	CAP,CER AXIAL,561,10%,50V,X7R	2	C7,C20

LVL	PART#	DESCRIPTION	QTY	REF. DESIG.
2	031-1227-0	CAP,ELEC,RAD,227,-10%+50%,25V	2	C65,C66
2	031-2335-0	CAP,ELEC,RAD,335,20%,50V	2	C60,C68
2	032-3104-0	CAP,PE,104,5%,63V	1	C2
2	038-0106-0	CAP,ELEC,AXIAL TR,106,20%,16V	4	C11,C72,C82,C84
2	038-2105-A	CAP,ELEC AXIAL TR,105,20%,50V	1	C87
2	051-1002-0	RES,CARBON FILM,1K OHM,1/4W,5%	2	R73,R83A
2	051-1005-0	RES,CARBON FILM,1M OHM,1/4W,5%	1	R4
2	051-1203-0	RES,CARBON FILM,12K OHM,1/4W,5%	7	R1,R13,R34,R38,R42,R47,R83
2	051-1204-0	RES,CARBON FILM,120K OHM,1/4W,5%	1	R15
2	051-2201-0	RES,CARBON FILM,220 OHM,1/4W,5%	2	R62,R75
2	051-2202-0	RES,CARBON FILM,2.2K OHM,1/4W,5%	2	R77A,R88
2	051-2203-0	RES,CARBON FILM,22K OHM,1/4W,5%	2	R31,R58
2	051-2204-0	RES,CARBON FILM,220K OHM,1/4W,5%	2	R19,R21
2	051-3302-0	RES,CARBON FILM,3.3K OHM,1/4W,5%	1	R23
2	051-3303-0	RES,CARBON FILM,33K OHM,1/4W,5%	4	R5,R18,R78,R86
2	051-4701-0	RES,CARBON FILM,470 OHM,1/4W,5%	2	R70,R81
2	051-4702-0	RES,CARBON FILM,4.7K OHM,1/4W,5%	3	R3,R30,R85
2	051-4703-0	RES,CARBON FILM,47K OHM,1/4W,5%	4	R40,R48,R57,R79
2	051-4704-0	RES,CARBON FILM,470K OHM,1/4W,5%	5	R28,R33,R37,R43,R50
2	051-5602-0	RES,CARBON FILM,5.6K OHM,1/4W,5%	5	R27,R44,R51,R56,R59
2	051-5603-0	RES,CARBON FILM,56K OHM,1/4W,5%	1	
2	052-0000-0	RES,CARBON FILM 0 OHM,1/4W,5%	9	R9,R12,R32,R52,R54,R64,R77,R75A,R76A
2	070-1513-0	POT,50K-15A,7MM,KNURL, .1W	1	R14-volume
2	070-1514-0	POT,50KB,7MM,KNURL, .1W	5	R36,R53,R63,R67,R89- EQ, master pots
2	070-1522-0	POT,2KB,7MM,KNURL, .1W	1	R76-boost
2	090-0014-0	SWITCH,PP,DPDT, .2A,BREAK/MAKE,PC	4	S1,S2,S3,S4- all switches
2	092-0076-0	JACK S2-BNB,1/4",S-TIP,PC TERM	2	J1,J2- all jacks
2	093-0028-0	HDR,.156X3,VERT,MALE,LOCK	1	P2
2	093-0029-0	HDR,.156X4,VERT,MALE,LOCK,ROUND	1	P1
2	145-0047-E	400RB PREAMP BRD	1	