Service Manual

400RB

GK GALLIEN-KRUEGER

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OPERATORS MANUAL 400RB

THE BASICS

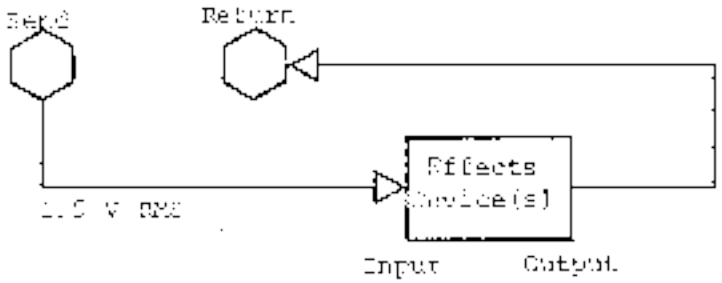
Your new 400RB represents the latest advances that technology has to offer. It was designed to provide the widest possible range of usable sounds. The combination of three voicing filters with four bands of active EQ is unbeatable for flexibility and ease of operation. This amplifier has many features, 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

Normal Gain	
Sensitivity	2mv rms
Max Level	1V rms
Impedance	1M ohm
-10dB Gain	
Sensitivity	6mv rms
Max Level	3V rms
Impedance	1M ohm
Effects Send	
Level	1.5V rms (boost off)
Load Impedance	100k ohm min
Effects Return	
Level	1.5V rms (boost off)
Impedance	40k ohm
Direct	
Level	501mv rms
Impedance Min	600 ohm
Speakers Max	
8 ohm	2 max
4 ohm	1 max
Power	
8 ohm	125w
4 ohm	200w
Boost Preset	Switch to Ground
Shipping Weight	54 lbs.
Dimensions	16" height x 17¾" 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

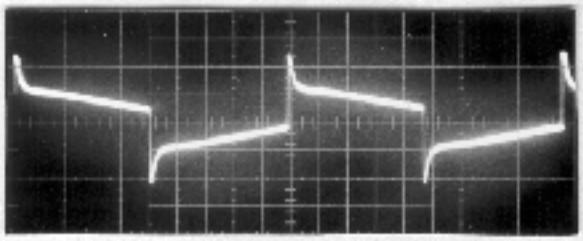


Fig. 1. Tones Center, Filters Off.

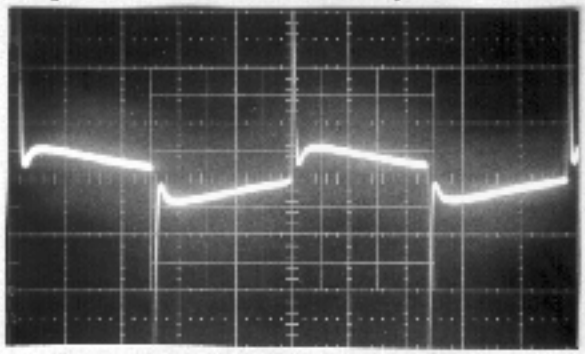


Fig. 2. Treble to 10.

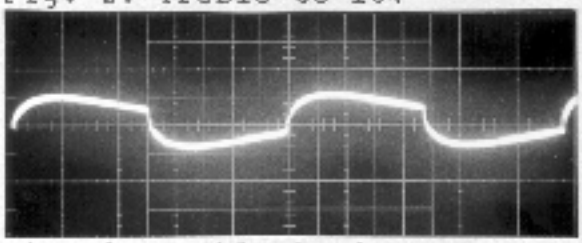


Fig. 3. Treble to 0.

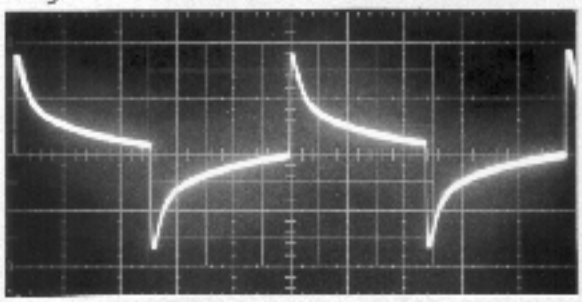


Fig. 4. Hi-Mid to 10.

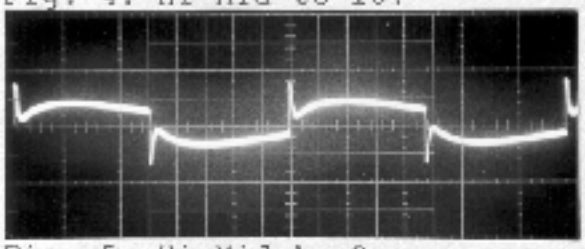


Fig. 5. Hi-Mid to 0.

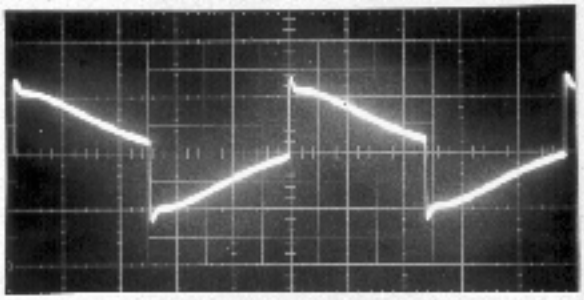


Fig. 6. Lo-Mid to 10.

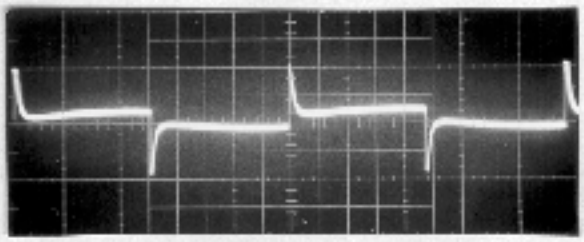


Fig. 7. Lo-Mid to 0.

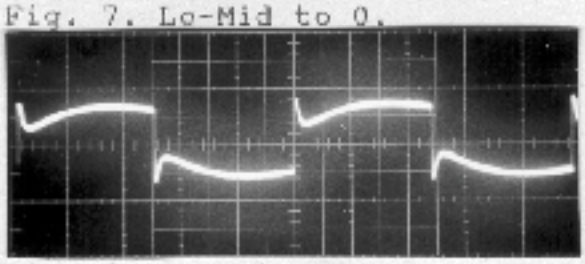


Fig. 8. Bass to 10.

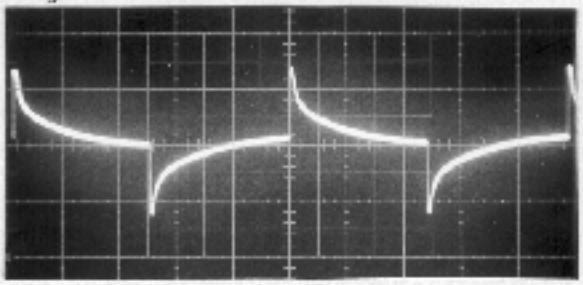


Fig. 9. Bass to 0.

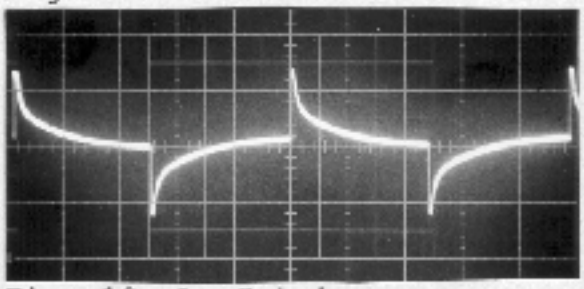


Fig. 10. Lo-Cut in.

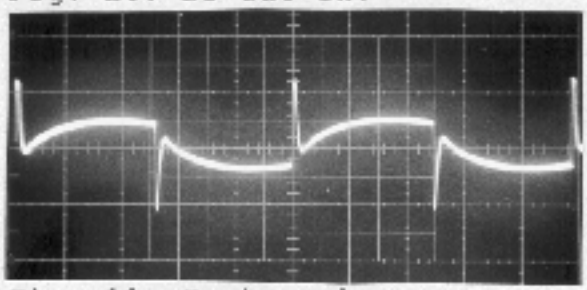


Fig. 11. Contour in.

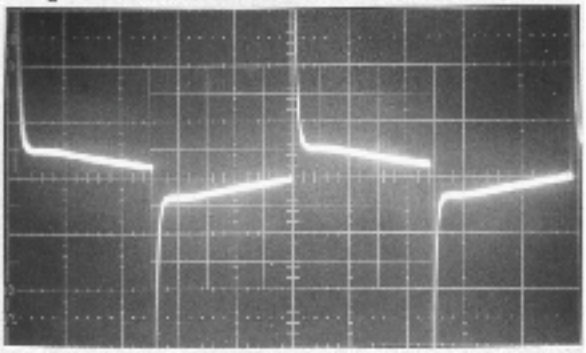
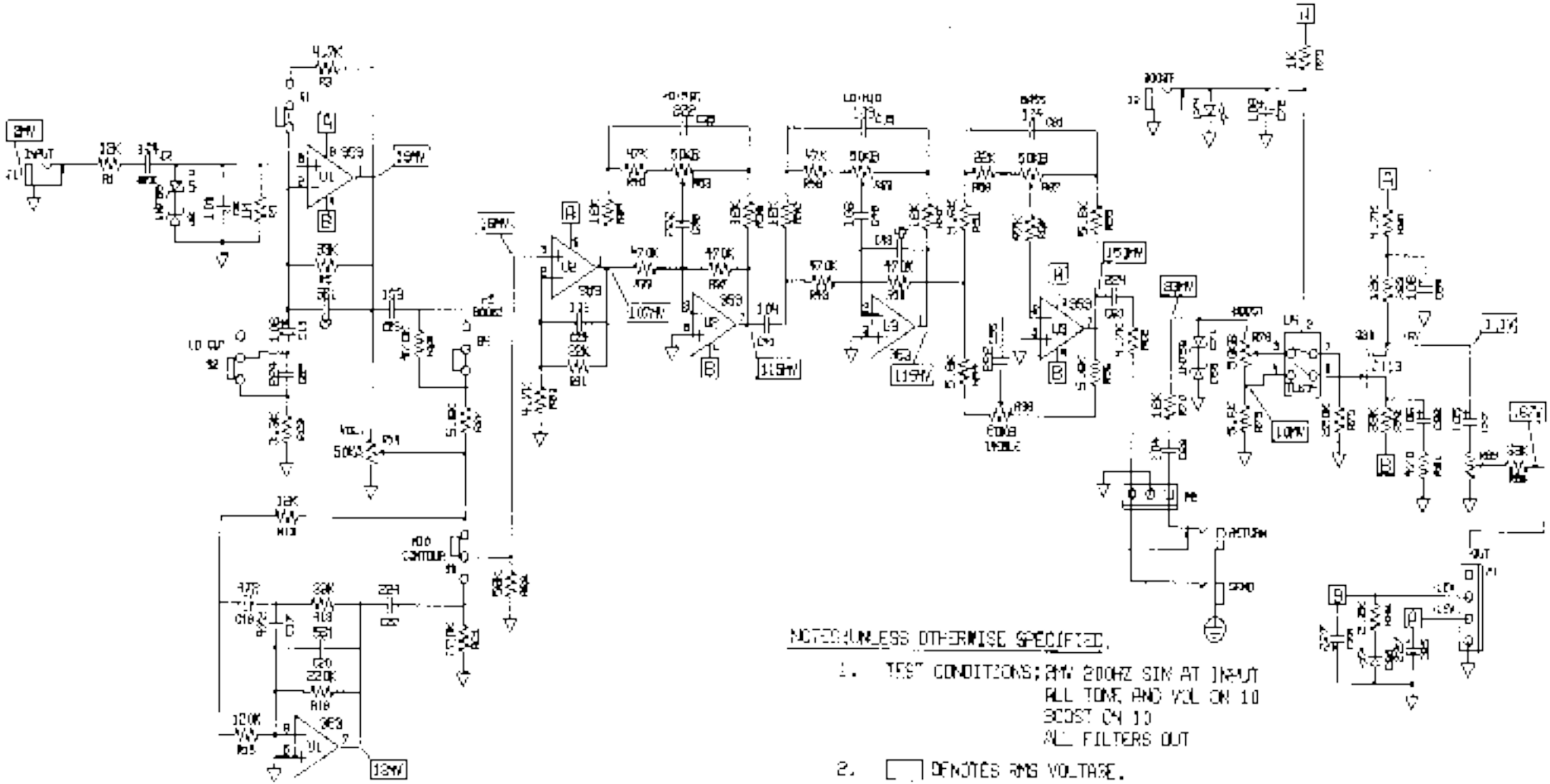
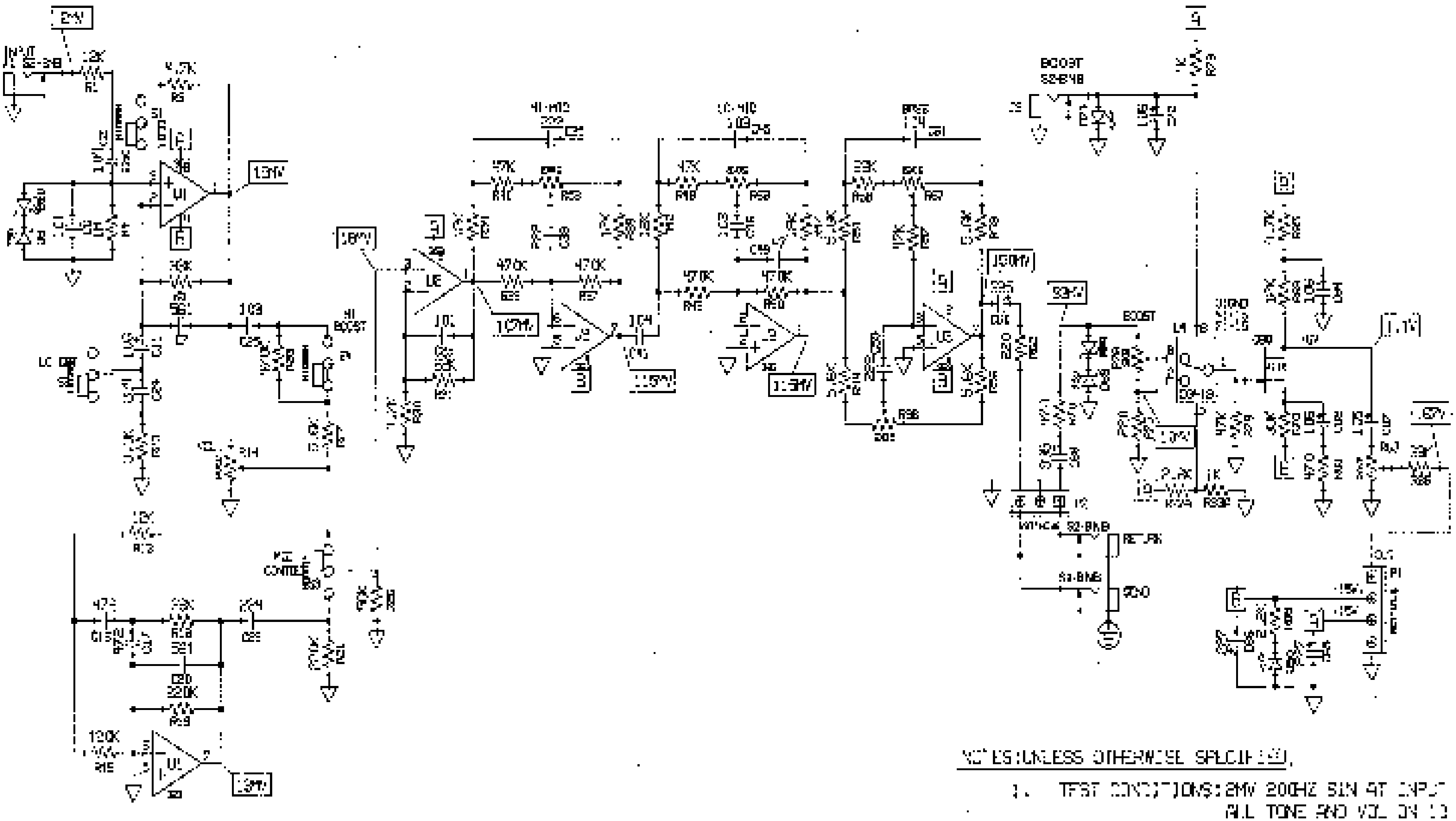


Fig. 12. High Boost in.



PCO#	DATE	FIRST SN	PCO#	DATE	FIRST SN	PCO#	DATE	FIRST SN	PCO#	DATE	FIRST SN

GALLIEN-KRUEGER	MODEL #: 400RB	DATE: 8/13/91	DESCRIPTION: MW 400RB PREAMP			
SCHEMATIC PG: 1 OF: 1	DRF: 800470	DESIGNED BY: MPJ/RAG	PART #: 406-0047-0	PCB# DATE: -	FROM SN:	TO SN



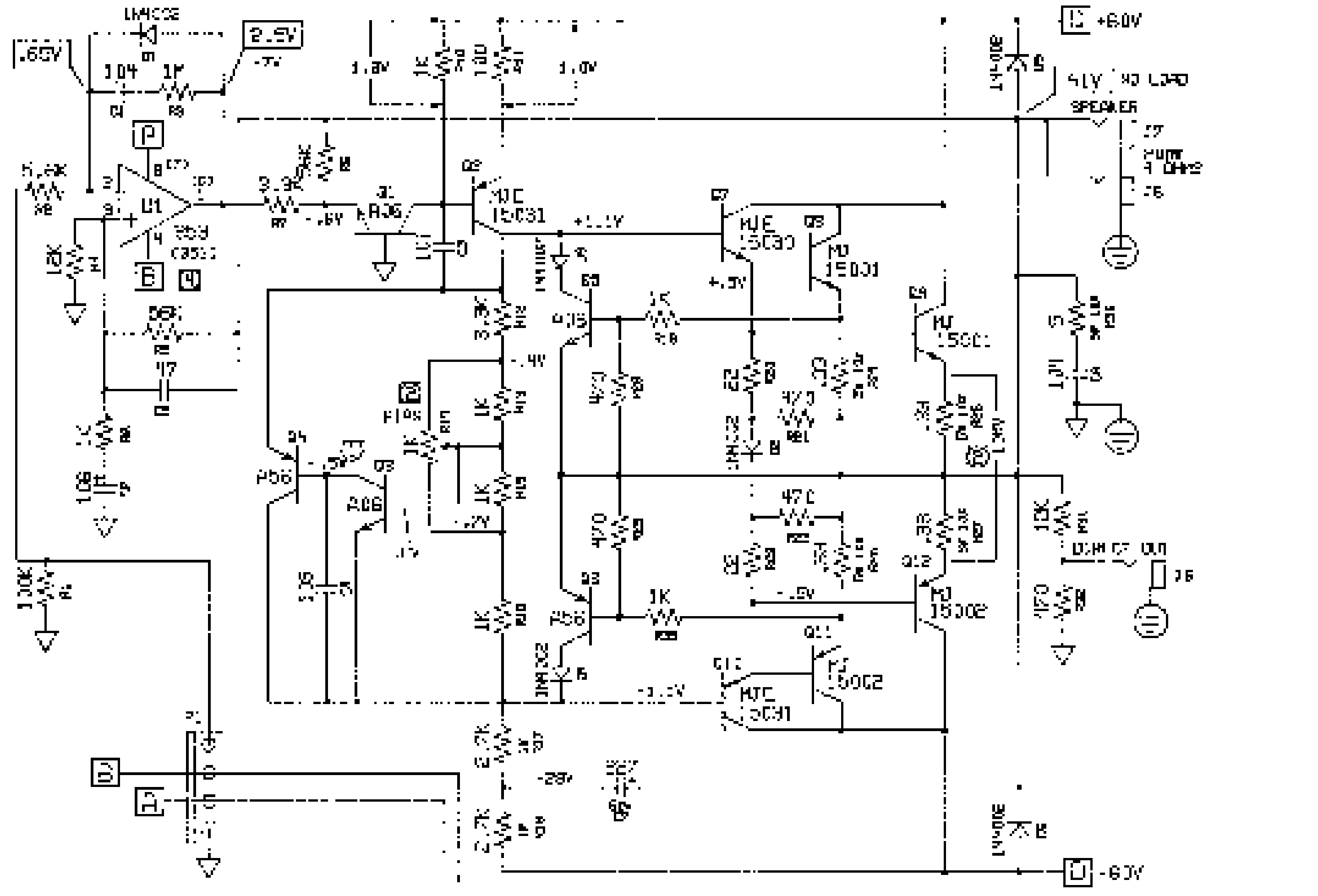
NOTES: UNLESS OTHERWISE SPECIFIED,

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

2. [ ] DENOTES RMS VOLTAGE.

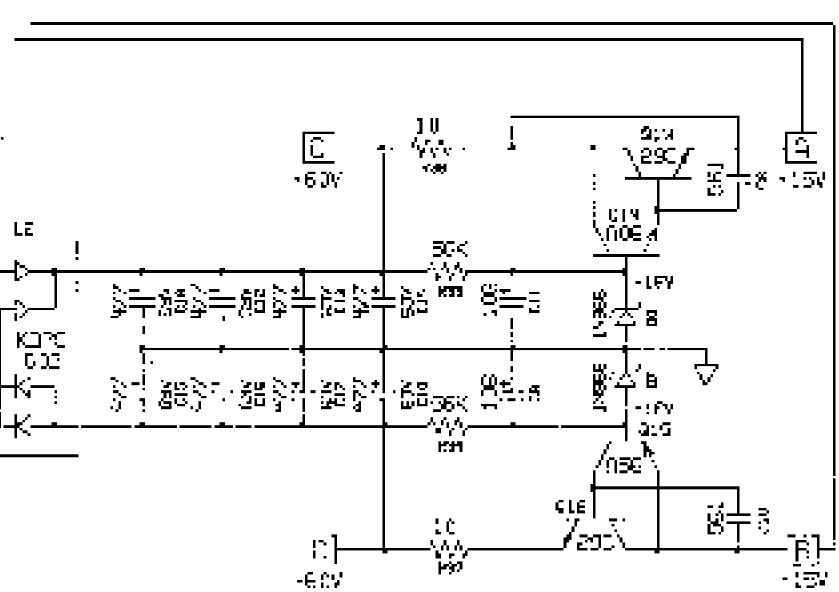
GALLIEN TECHNOLOGY 408-440-0001 2240 PARAGON, SAN JOSE, CA 95131	MODEL #: 400RB	DATE: 5/25/95	DESCRIPTION: NEW 400RB PREAMP
SCHEMATIC PG: 1 OF 1	DBF: 600HVD	DESIGNED BY: PART #: MPJ/RAG 406-0047-D/E	REV# DATE: FOR: (COMPANY) - GALLIEN-KRUEGER

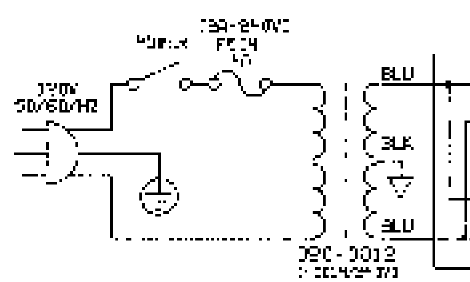
REV#	DATE			



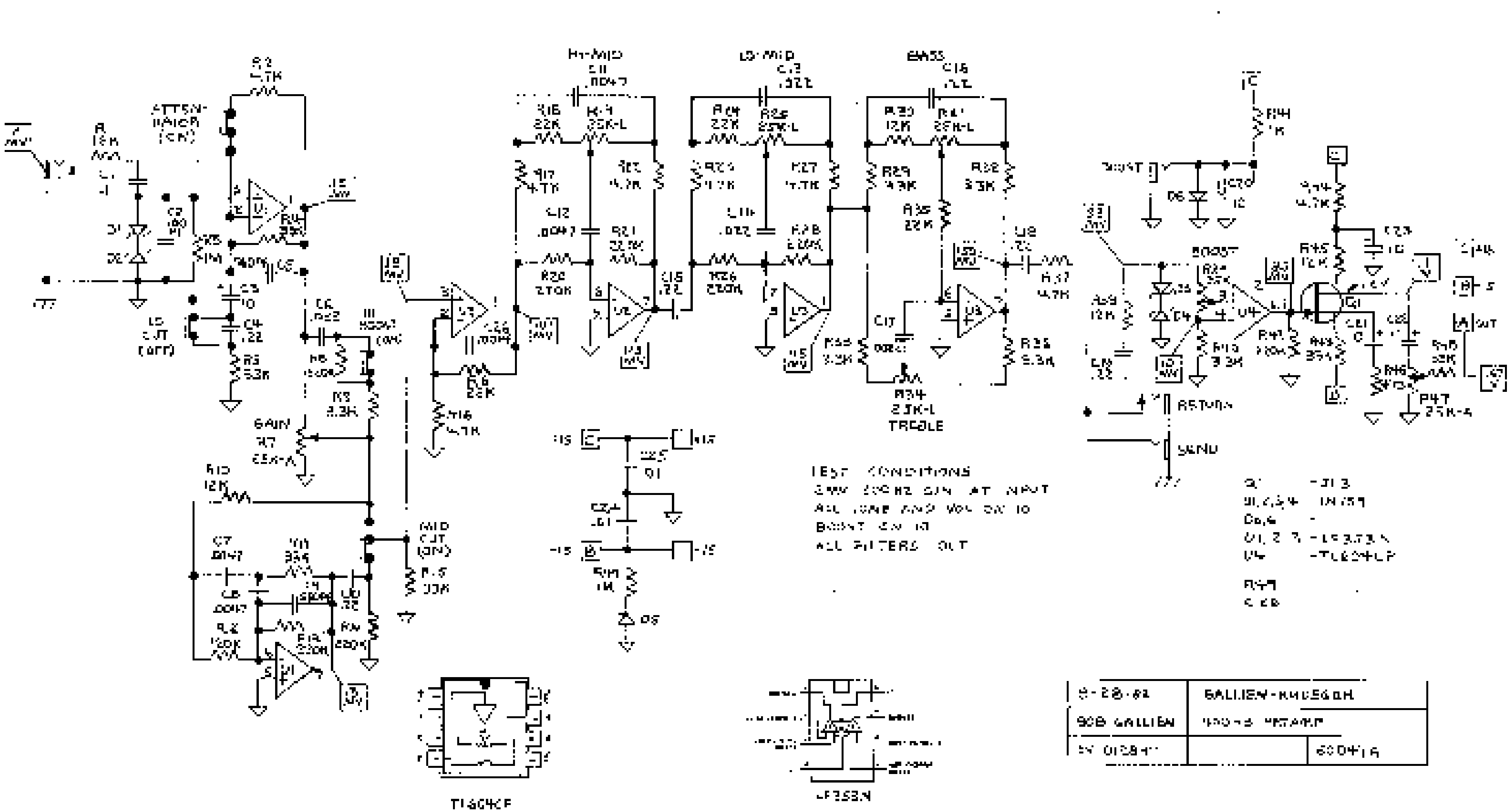
NOTES:UNLESS OTHERWISE SPECIFIED.

1. Q3 MOUNTED ON HEATSINK
2. ADJUST BIAS FOR 6MV ACROSS EACH, R26 AND R27
3. [ ] DENOTES RMS VOLTAGE.
4. U1 IS LF351 ON A-BOARD

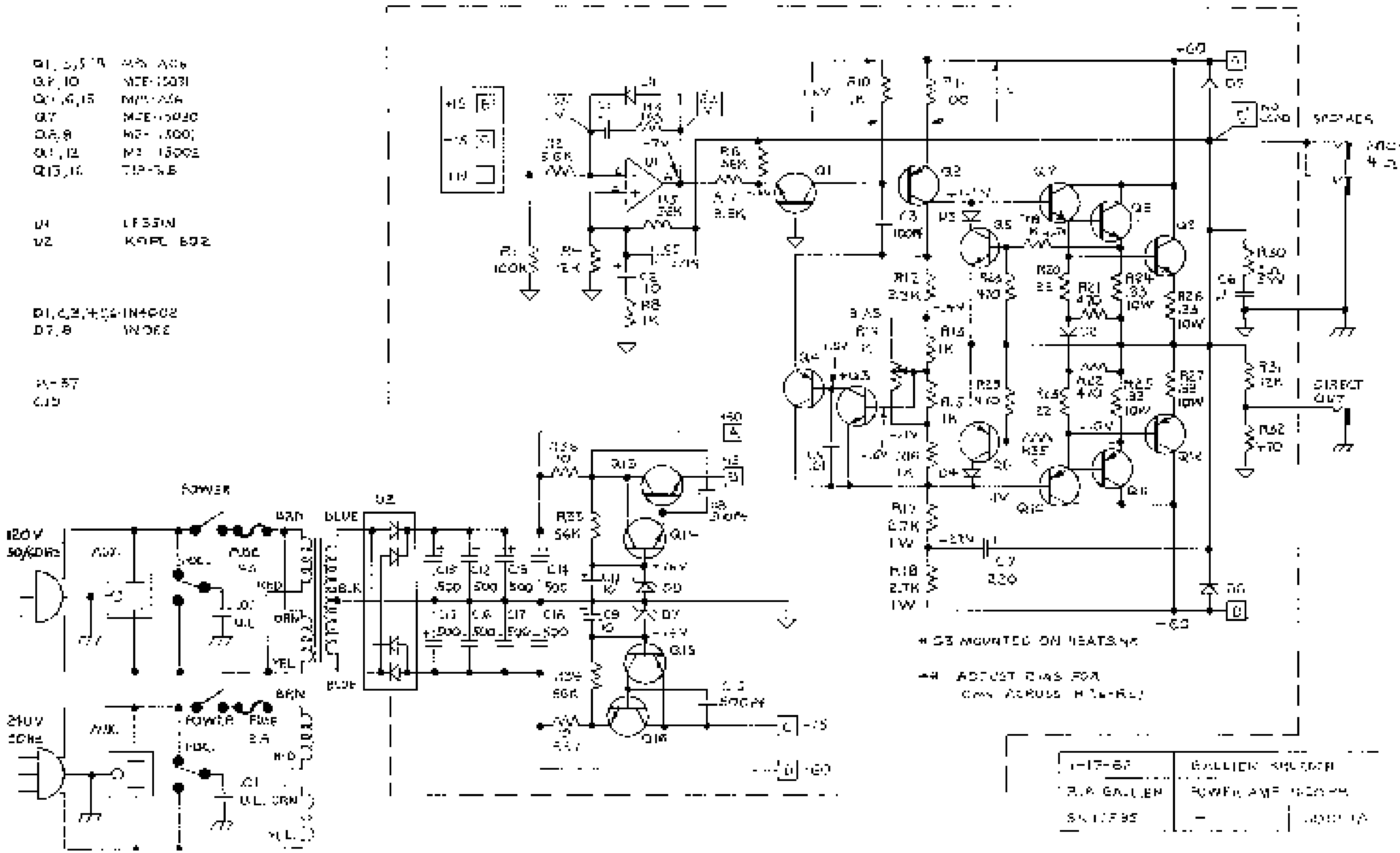




GK DOCUMENT #: 405-0041-C	ECO#	DATE			
GALLIEN-KRUEGER	MODEL #: 400RB	DATE: 4/1/92	DESCRIPTION: POWER AMP, POWER SUPPLY		
SCHEMATIC PG: 1 OF 1	DEF: 600410	DESIGNED BY: R.A.G.	PART #: 406- PCB=-DATE: 0041C,0041C	FROM SN:	TO SN:

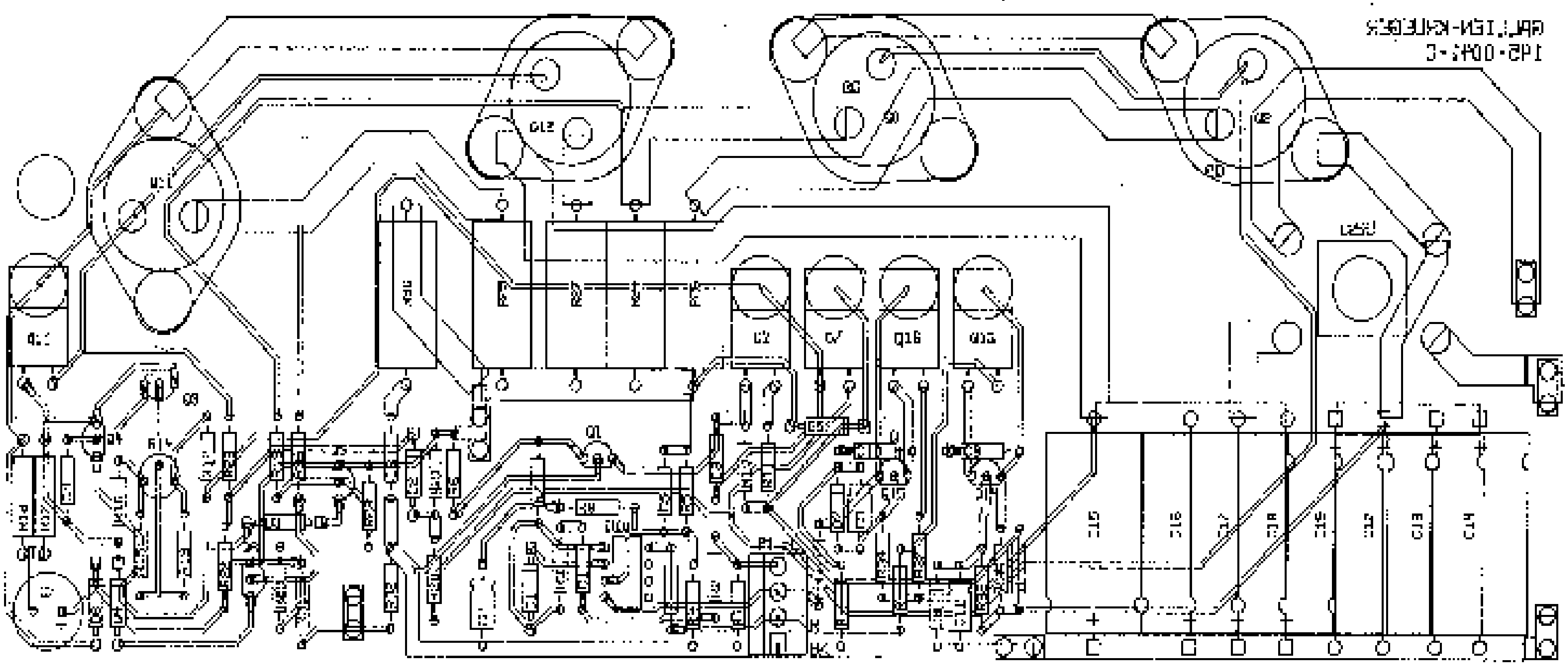


HI-MID
LO-MID
BASS
TREBLE
GAIN
BOOST
RETURN
SEND
TEST CONDITIONS
ALL FILTERS OUT
GALLIEN-KRUEGER
BOB GALLIEN



LF351N
KBPC 602
POWER
120V
50/60Hz
240V
AUX.
FUSE
BRN
BLUE
BLK
ORN
YEL
RED
U1
U2
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
R1 100K
R6 56K
R7 8.2K
R8 1K
R10 1K
R12 3.3K
R13 1K
R15 1K
R17 2.7K 1W
R18 2.7K 1W
R20 33
R21 470
R22 470
R23 470
R24 470
R26 .33 10W
R27 .33 10W
R31 12K
R33 56K
R35 22
R52 470
C3 100PF
C7 220
C15 500
C12 500
C13 500
C14 500
C16 500
C17 500
C18 500
C22 300PF
+60
-60
+15
-15
SPEAKERS
DIRECT OUT
BIAS
D3
D4
D5
D6
D7
D8
Q3 MOUNTED ON HEATSINK
** ADJUST BIAS FOR

Traces
Values
Ref. dealg.



403-0041 REV C

GALLIEN-KRUEGER

PCO#	DATE

GALLIEN-KRUEGER	MODEL #: 400RB	DATE: 3/26/92	DESCRIPTION: POWER AMP/SUPPLY BOARD	
CIRCUIT BOARD ARTWORK	DBF: 500410	DESIGNED BY: R.A.G.	BOARD #: 236-0041-C	REV#-DATE:	FROM SN:	TO SN:

GALLIEN-KRUEGER PRODUCTION CHANGE ORDER PCO#: 400RB [illegible] / 800RB: [illegible]

DATE: 2/1/93 | ASSEMBLY #: 302-0050 / 302-0060 | MODEL#: 400RB/800RB

ASSEMBLY DESCRIPTION: 400RB/800RB Main Assembly | PAGE ___ OF ___

AFFECTS OPTIONS: ☒ ALL ☐ 100V ☐ 120V ☐ 220V ☐ 240V ☐ 50HZ ☐ 60HZ

TYPE OF CHANGE:
- ☐ NECESSARY TO THE FUNCTION OF THE UNIT
- ☐ IMPROVEMENT OR ADDITION TO THE UNIT
- ☒ OTHER Done for CSA approval

CHANGE TO BE IMPLEMENTED TO:
- ☒ NEXT PRODUCTION RUN
- ☐ ALL UNITS IN PRODUCTION
- ☐ ALL UNITS IN STOCK
- ☐ ALL UNITS BEING SERVICED
- ☐ OTHER ______

REMARKS:

BEGINNING SERIAL NUMBER AFFECTED:

DESCRIPTION OF CHANGE: ☐ SEE PCO SUPPLEMENTS ☐ CONTINUED ON PCO SUPPLEMENT PAGE ____

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.

REASON FOR CHANGE:

CSA requires these changes for approval.

PARTS ADDED				PARTS DELETED			
PART#	DESCRIPTION	QTY.	REF. DES.	PART#	DESCRIPTION	QTY.	REF. DES.

☐ CONTINUED ON PAGE ____ ☐ CONTINUED ON PAGE ____

AFFECTED AREAS	DONE BY	DATE	AFFECTED AREAS (CONT.)	DONE BY	DATE
☐ CIRCUIT SCHEMATIC			☐		
☐ BILL OF MATERIAL			☐		
☐ AUTO INSERTER			☐		
☒ SAMPLE CHANGE			DOCUMENT DIST. LIST	# COPIES	
☐ TEST PROCEDURE			☐ GK USA		
☐ COMP. CONTROL FORM			☐ SERVICE CENTERS		
☐ FAB DRAWING			☐ GK EUROPE		
☐ PUNCH PROGRAM			☐ GK CAMPBELL		
☐ PUNCH SAMPLE			☐ ENGINEERING		
☐ ASSEMBLY PROCEDURES			☐ FABRICATION		
☐ ARTWORK			☐ PRODUCTION		
☐ SILKSCREEN TEMPLATE			☐ OUTSIDE SUPPLIERS		
☐			☐		

DRAWING(S) SHOWING MODIFICATION ATTACHED: ☒ NO ☐ YES-SPECIFY:

WRITTEN BY: Michael Johns DEPT: Eng DATE: 2/1/93

REVIEWED/APPROVED BY: ______ DEPT: ______ DATE: ______

PCOFORM

GALLIEN TECHNOLOGY Tel (408) 441-3061 Fax (408) 441-3025
2240 Paragon Dr., San Jose, CA 95131

ECO# 11

ENGINEERING CHANGE ORDER

MODEL: 400BB

CUSTOMER: Gallien Krueger
DESC: 400BB preamp
ASSY# 200-0047 (195-0047) REV# 44-7 D

LEVEL: [ ] System [X] Board [ ] Fab

DATE: 2/14/95
ORIGINATOR: M Johns

[X] EFFECTIVE
[ ] Next production Run
[ ] All in Process
[ ] All in Stock
[ ] All being Serviced
[X] Others: when orders is placed for new boards

[ ] PENDING
Pending/Reject Reason:

Type of Change: [ ] Necessary [X] Improvement [ ] Other:

APPROVAL	INITIAL	DATE
Engineering	MJ	2/14/95
Material		
Production		
Fabrication		
Marketing		
Cost accounting		

REASON FOR CHANGE:
To replace TL 604 w/ Siliconix DG419

Continued on ECO supplement page

DESCRIPTION OF CHANGE:
Board is re-layed out to accommodate DG419 instead of TL604. Rev # 3eD from 44-6 D.

Continued on ECO supplement page

AFFECTED AREA:
[X] Schematic
[X] Artwork
[X] Bill of Material
[X] Comp. Control Form
[ ] Assembly Drawing
[ ] Test Procedure
[ ] Fab Drawing
[X] Silkscreen
[ ] Punch Program

TOTAL PARTS ADDED:

PART#	DESCRIPTION	QTY	REF.DES.
	355 cap	2	C60, C6B
	220Ω res	2	R62, R75
	470Ω res	1	R70
	2KB pot	1	R76
	47K res	1	R79

TOTAL PARTS DELETED:

PART#	DESCRIPTION	QTY	REF.DES.
	224 cap	1	C60
	4.7K res	1	R62
	104 cap	1	C6B
	12K res	1	R70
	50KB pot	1	R76

over →

DISTRIBUTION: [X] Engineering [X] Material [X] Production [ ] Fabrication [ ] Others:

F-0026 REV A

GALLIEN TECHNOLOGY Tel: (408) 441-8091
2240 Paragon Dr., San Jose, CA 95131 Fax: (408) 441-8025

ECO# 11

ECO SUPPLEMENT

MODEL: 400PS

CUSTOMER ______

DESC. ______

ASSY# ______ REV# ______

LEVEL: ☐ System ☐ Board ☐ 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.
	2.2K res	1	R71A		5.6K res	1	R75
	1K res	1	R83A		220K res	1	R79
	DG419	1	U4		TL084	1	U4

FORM REV. A

GALLIEN TECHNOLOGY
2240 Paragon Dr., San Jose, CA 95131
Tel: (408) 441-8081
Fax: (408) 441-8085

ECO# 17

ENGINEERING CHANGE ORDER

MODEL: 400RB

CUSTOMER: Gallien Krueger
DESC. 400RB preamp board
ASSY# [illegible]-0047-D REV# D

LEVEL: [ ] System [X] Board [ ] Fab

DATE: 11/16/95
ORIGINATOR: M. Jahn

[X] EFFECTIVE
- [X] Next production Run
- [X] All in Process
- [ ] All in Stock
- [ ] All being Serviced
- [X] Others: until old boards and components are used up.

[ ] PENDING
Pending/Reject Reason:

Type of Change: [ ] Necessary [ ] Improvement [X] Other:

APPROVAL	INITIAL	DATE
Engineering	MJ	11/16/95
Material		
Production		
Fabrication		
Marketing	Reinig	11/16/95
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 400RB boards (this undoes some of ECO #11's changes)

Continued on ECO supplement page

AFFECTED AREA:
- [ ] Schematic
- [ ] Artwork
- [X] 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 220Ω to 4.7K.
3) Change C68 from 335 to 104.
4) Change R70 from 470Ω to 12K.
5) Change R76 from 2KB pot to 50KB pot
6) Change R75 from 220Ω to 5.6K
7) Change R79 from 47K to 220K.

Continued on ECO supplement page

TOTAL PARTS ADDED:

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

TOTAL PARTS DELETED:

PART#	DESCRIPTION	QTY	REF.DES.
	335 cap	2	C60, C68
	220Ω res	2	R62, R75
	470Ω res	1	R70
	2KB pot	1	R76
	47K res	1	R79

DISTRIBUTION:
[ ] Engineering [ ] Material [ ] Production [ ] Fabrication [ ] Others:

FORM#: REV A 12-7-93

GALLIEN TECHNOLOGY
2240 Paragon Dr., San Jose, CA 95131
Tel: (408) 441-8081
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ECO# 19

ENGINEERING CHANGE ORDER

MODEL: 400RB

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

LEVEL: [ ] System [X] Board [ ] Fab

DATE: 4/19/96
ORIGINATOR: MG [illegible]

[X] EFFECTIVE	[ ] PENDING	APPROVAL	INITIAL / DATE
[X] Next production Run	Pending/Reject Reason:	Engineering	MG 4/19/96
[X] All in Process		Material	
[ ] All in Stock		Production	
[ ] All being Serviced	Type of Change: [ ] Necessary	Fabrication	
[ ] Others:	[ ] Improvement	Marketing	
	[X] Other	Cost accounting	

REASON FOR CHANGE:

Use new parts, 7mm bushing instead of 9mm.

Continued on ECO supplement page

DESCRIPTION OF CHANGE:

1) All pots change from 9mm version to 7mm versions.
2) Move R53 and R44 on layout.
3) Delete 2 jumpers (0Ω) at R75A, R76A.

Continued on ECO supplement page

AFFECTED AREA:

- [ ] Schematic
- [X] Artwork
- [X] Bill of Material
- [ ] Comp. Control Form
- [X] Assembly Drawing
- [ ] Test Procedure
- [X] Fab Drawing — see ECO#18
- [ ] Silkscreen
- [ ] Punch Program

TOTAL PARTS ADDED:				TOTAL PARTS DELETED:			
PART#	DESCRIPTION	QTY	REF.DES.	PART#	DESCRIPTION	QTY	REF.DES.
152-[illegible]	0Ω res	2	R75A, R76A	070-0519-0	50KA pot 9mm	1	R14
070-1559-0	50KA pot 7mm	1	R14	070-0514-0	50KB pot 9mm	1	R26,51,65,69,89
070-1510-0	50KB pot 7mm	5	R26,53,65,69,89	070-0580-0	2KB pot 9mm	1	R76
070-1528	2KB pot 7mm	1	R76				

DISTRIBUTION:
[X] Engineering [X] Material [X] Production [ ] Fabrication [ ] Others:

FORM#: REV A

12/793

400RB-II

6/22/99 **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,C-216A	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	*080-0012-0*	*TRANSFORMER,200W,120V,Z=4*	*1*	
1	090-0008-0	SWITCH,ROCKER,SPST,4A,QUICK-TERM	1	
1	*091-0005-0*	*FUSE, 5A,125V,1/4X1 1/4,SLB*	*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	*093-0014-0*	*RECEPTACLE AC,Q-TERM*	*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	*095-0005-0*	*POWER CORD,117V PLUG,DETACH*	*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-220MGT	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,C8
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	