KRELL

THE LEADER IN AUDIO ENGINEERING

KAV–250cd Compact Disc Player Service Manual

v99.0
September, 1999

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Schematic Diagrams and Bill of Materials are separately attached

HDCD® is the registered trademark of Pacific Microsonics, Inc.

KAV-250cd Compact Disc Player Specifications

Frequency Response
20 Hz – 20 kHz +0.0dB, -35dB

Signal to Noise Ratio
103dB, "A" weighted

Distortion
20 Hz – 20 kHz -84dB THD

Power Consumption
30 W

Transport
Drawer Loading, mechanically isolated drive mechanism featuring a linear drive laser assembly

DAC
20-bit Dual Burr Brown PCM-1702 devices

Analog Outputs
1 pair balanced via XLR connectors
1 pair single-ended via RCA connectors

Digital Output
1 SPDIF via RCA connector

Remote Control
Wireless Infrared

Dimensions
19w x 3.7h x 15d inches
48w x 9.4h x 38d centimeters

Weight
Unit 18 lbs., 8.2 kg
Shipping 28 lbs., 12.7 kg

KAV–250cd Compact Disc Test Procedure

1. Purpose

To verify proper assembly and functionality

2. Test Equipment Required

1 Fluke 75 MM or a 8085 A MM or equivalent (Digital Multi-Meter)
1 Hitachi V-212 Oscilloscope or equivalent
1 ATS-1 (Audio Precision Analyzer) or equivalent
1 Variac (Autoformer), 240 VAC output capable
1 Pacific Microsonics HDCD® Process Test Disc
1 CBS CD 1 Standard Test Disc
1 DAC Processor with Coaxial and Toslink inputs and sync lock indicator.

3. KAV-250cd Preliminary Test Procedure

a) Visually inspect the KAV-250cd for all proper cable and hardware connections. Set the KAV-250cd to the appropriate line voltage.

b) Set the Variac to the appropriate voltage position. Plug the Variac's output AC cord into the KAV-250cd. If no problem is found, turn off the Variac with the dial still set to the proper voltage. Turn on again to reset the microcontroller.

c) Observe that the Stand-by LED and the HDCD® LED illuminate momentarily. The Display window will not illuminate until the Power button is pressed. Press the Power button. The Stand-by LED will extinguish and the Power LED illuminates. The Display window will illuminate the following: 0, track, index, M, S.

d) Make the proper balanced output connections between the KAV-250cd and test equipment. Load the CBS test disc, set track 1 to repeat and press play. The Voltage will be approximately 4 V on the output. Adjust the output for 4.000 Vrms with the corresponding trim pots for each channel.

Note: Use the Open/Close button to load the disc. Make sure the KAV-250cd reads and displays the contents of the disc. After approximately 6 seconds the Display window will stop showing the contents, and show the number 1 and 0:00.

e) Use the Analyzer to check that the KAV-250cd conforms to the following requirements:

Balanced Output

Output Voltage	= 4.000 V	
THD @ 1 kHz	≤ -85 dB	(set bandwidth for THD @ 20 Hz – 20 kHz)
Noise Low	≤ -94 dB	
Noise Low	≤ -90 dB	(DCO for all phases + 000.0 V +/- 5 mV)

Note: Noise and THD are taken with reference to their output voltage.
Play track 1 for the Output Voltage Specification
Play track 8, index 1 for the THD Specification
Play Track 4 for the Noise Specification

f) While monitoring the balance output for both channels, place the KAV-250cd into the pause mode. The output will drop to zero and the Pause Symbol " will illuminate. Take the KAV-250cd out of pause and the signal will return for both channels and the Display extinguishes.

g) Remove the balance connections from the KAV-250cd and make the proper single-ended connections between it and the AST-1.

h) Remove the CBS test disc and then load the HDCD® test disc.

- Play track 1. The Voltage reading will be approximately 2 V.
- Play track 2. The HDCD® LED will illuminate, the output voltage is approximately 4 V, or twice the voltage of track 1, the non-HDCD® track played.
- Play track 1. The output voltage will return to approximately 2 V and the HDCD® LED will extinguish.

i) Confirm that the digital outputs sync locks with processor.

j) Confirm all face plate buttons perform their proper indicated operation. Confirm remote control operation.

k) Remove the test disc and all connections from the KAV-250cd.

4. Burn-in Procedure

a) Switch off the unit and let sit for five or ten minutes. Turn the unit back on and load the CBS test disc. Program the 1st and last tracks of the disc and set disc to the repeat mode.

b) Allow unit to sit, turned on for 1 day. Confirm functionality of all operations.

c) Proceed with Final Test Procedure.

5. Final Test Procedure

a) Set the Variac to the appropriate voltage position. Plug the Variac's output AC cord into the KAV-250cd.Turn on the Variac and follow step c) through k) of the KAV-250cd Preliminary test procedure.

Note: Refer to the following requirements instead of step e) in the Preliminary test procedure.
At step h), perform the HDCD® test, balance out.
Verify for proper single ended operation.

Balanced Output	**Single-Ended**
Non HDCD® Output Voltage = 3.950 V ≤ V ≤ 4.050 V (Track 1 HDCD test disc)	Non HDCD® Output Voltage = 1.975V ≤ V ≤ 2.025V
HDCD® Output Voltage = 7.900 V ≤ V ≤ 8.100 V (Track 2 HDCD test disc)	HDCD® Output Voltage = 3.950V ≤ V ≤ 4.050V
Frequency Response (Use CBS test disc) @ 60 Hz & 1 kHz +0 dBr ± 0.02 dBr 60 Hz: Track 7, index 1 1 kHz: Track 8, index 1 @ 10 kHz -0.1 dBr ± 0.03 dBr 10 kHz: Track 9, index 1 16 kHz: Track 9, index 3 20 kHz: Track 10, index 1	
THD (Same tracks as Frequency Res.) @ 1 kHz ≤ -82 dB	THD @ 1 kHz ≤ -82 dB
Noise (Use Track 4 set to repeat, CBS)	
Noise ≤ -95 dB (Test @ 10 Hz - 300 kHz)	Noise ≤ -91 dB (Test @ 10 Hz - 300 kHz)

Note: DCO for all phases = 0.0V ± 6 mV

6. Pacific Microsonics HDCD® Process and CBS Records CD-1 Test Disc Contents

a) Pacific Microsonics HDCD® Process Test Disc Contents (by track number)

1 Non-HDCD® 0 dB FS, 1 kHz, Reference Tone

2 HDCD® maximum steady state level, 1 kHz tone

3 Non-HDCD® -14 dB, 1 kHz tone

4 Non-HDCD® -14 dB, 1 kHz tone, version 1

5 HDCD® -14 dB, 1 kHz tone, version 2

6 HDCD® -14 dB, 1 kHz tone, version 3

7 Non-HDCD® -74 dB, 997 Hz tone

8 HDCD® special DC test, version 1

9 HDCD® special DC test, version 2

b) CBS Records CD-1 Test Disc Contents (by track number)

1 Reference L & R
0dB, 1 kHz

2 Left Separation, 0 dB
1K, 125, 4K, 10K, 16K Hz

3 Right Separation, 0 dB
1K, 125, 4K, 10K, 16K Hz

4 Signal/Noise L & R
Infinity Zero w/o emphasis

5 Dynamic Range, L & R
1kHz, -60 dB w/o emphasis

6 Frequency Response
L & R, 0 dB, 4, 8, 17, 31 Hz

7 61, 127, 251, 499 Hz

8 997,1999,4001, 7993 Hz

9 10,007, 12,503, 16001, 17,989 Hz

10 19,997 Hz
(Also used for pitch error)

11 Sweep Frequency Response
0 dB, 5 Hz – 22.05 kHz

12 De-emphasis Error, L&R
1K, 125, 4K, 10K, 16K Hz

13 Intermodulation Distortion
(SMPTE, Twin Tone) L&R
60 Hz + 7 kHz

14 Wow and Flutter, L&R
0 dB, 3150 Hz

15 Access Time, L&R
0 dB, 317 Hz

16 Square Waves, L&R
0 dB, 1,002.27 Hz

17 Impulse & Polarity Test
0 dB, L&R

18 Linearity, 997 Hz, L&R
0 dB, -1, -3, -6, -10, -20, -30, -39.99,
-49.97, -59.94, -70.31, -80.77, -90.31 dB

19 Linearity with Dither
997 Hz, L&R
*-70.31, -80.77, -90.31, -100 dB

20 Fade to Noise w/ Dither, L&R
* -60dB, 500 Hz

21 Monotonicity, L&R
* 1,102.5 Hz 10 LSB

* Additional Test Tracks

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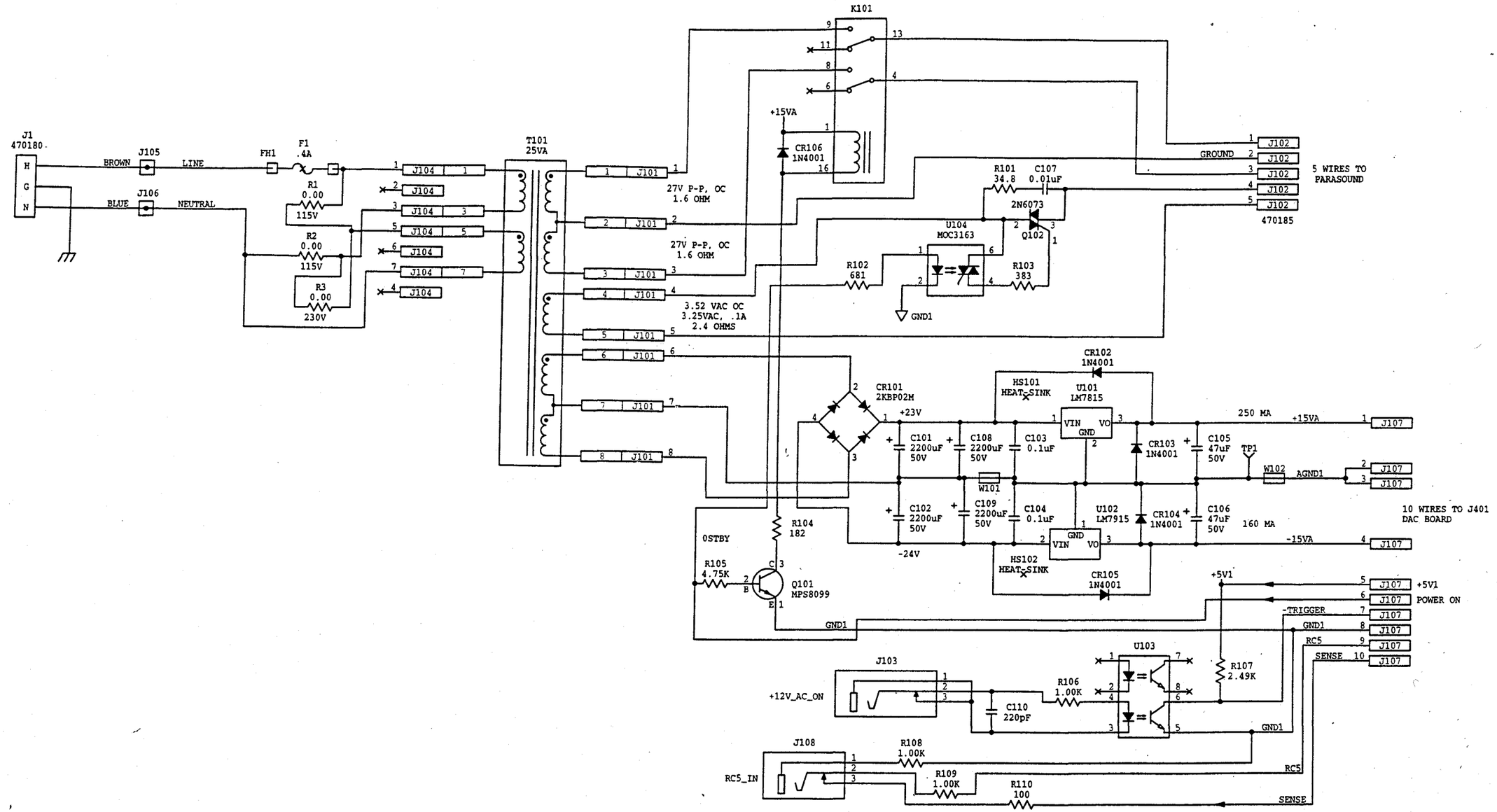
Schematics and Bill of Materials



DATE	DRAWN	CHECKED	ECO NO.	REV
				0
1/12/98	S.R.			1
2/24/98	S.R.		471	2
2/26/98	S.R.		475	3
3/26/98	S.R.		484	4

USED ON

RELEASED:

KRELL Industries, Inc.

TITLE

POWER SUPPLY

DRAWING NO. 820035\DSCH

SHEET 1 OF 6

DISPLAY PCB

SWITCH PCB

C207 0.1uF

R209 100K
R208 100K
R207 100K
R206 1.00K

U201 LC6554H

U202

VP
F
F
VDD
GND
O/CSW
PUIN
SMUTE
J203

PA+5V
PAGND

RN202 22K

C201 100uF 10V
C202 100uF 10V
C204 0.1uF

Y201 4.32MHz

RESET
TEST
CLOSE
OPEN
DOUT
DIN
/SCK
WQ
R/W
LASER
J204

C205 0.1uF

R204 22.1K

NO PIN

PAGND

10 wire ribbon

J201
J202

S203 OPEN/CLOSE

CR204 1N4148

R205 23.2

R+5V

CR201 HDCD RED

U204 TFMS_5380

C203 100uF 10V

RTGND

STOP
FP+5V

Q201 VN3205

GND

RC5 IN

FP+5V

Y202 4.00MHz

R215 10.0K

U206 34064

INPUT
RESET
GND

C208 0.1uF

C206 0.1uF

U205

R216 100K

R211 1.00K

-STOP

U203 60006500

MCLR
CLKIN
TOCKI
CLKOUT
RA0
RA1
RA2
RA3
RB0
RB1
RB2
RB3
RB4
RB5
RB6
RB7
RC0
RC1
RC2
RC3
RC4
RC5
RC6
RC7

U203A 60006500

R217 10.0K

S201 PLAY
S202 STOP
S204 PAUSE
S205 STANDBY/OPERATE
S206 BACK_TRACK
S207 NEXT_TRACK

RN201 10K

GND

TO J402
10 wire ribbon

J205
FP+5V
-FTRIGGER
FSENSE
FRCS
SENSE
RC5
GND
GND
-TRIGGER
-HDCD
1PWR ON

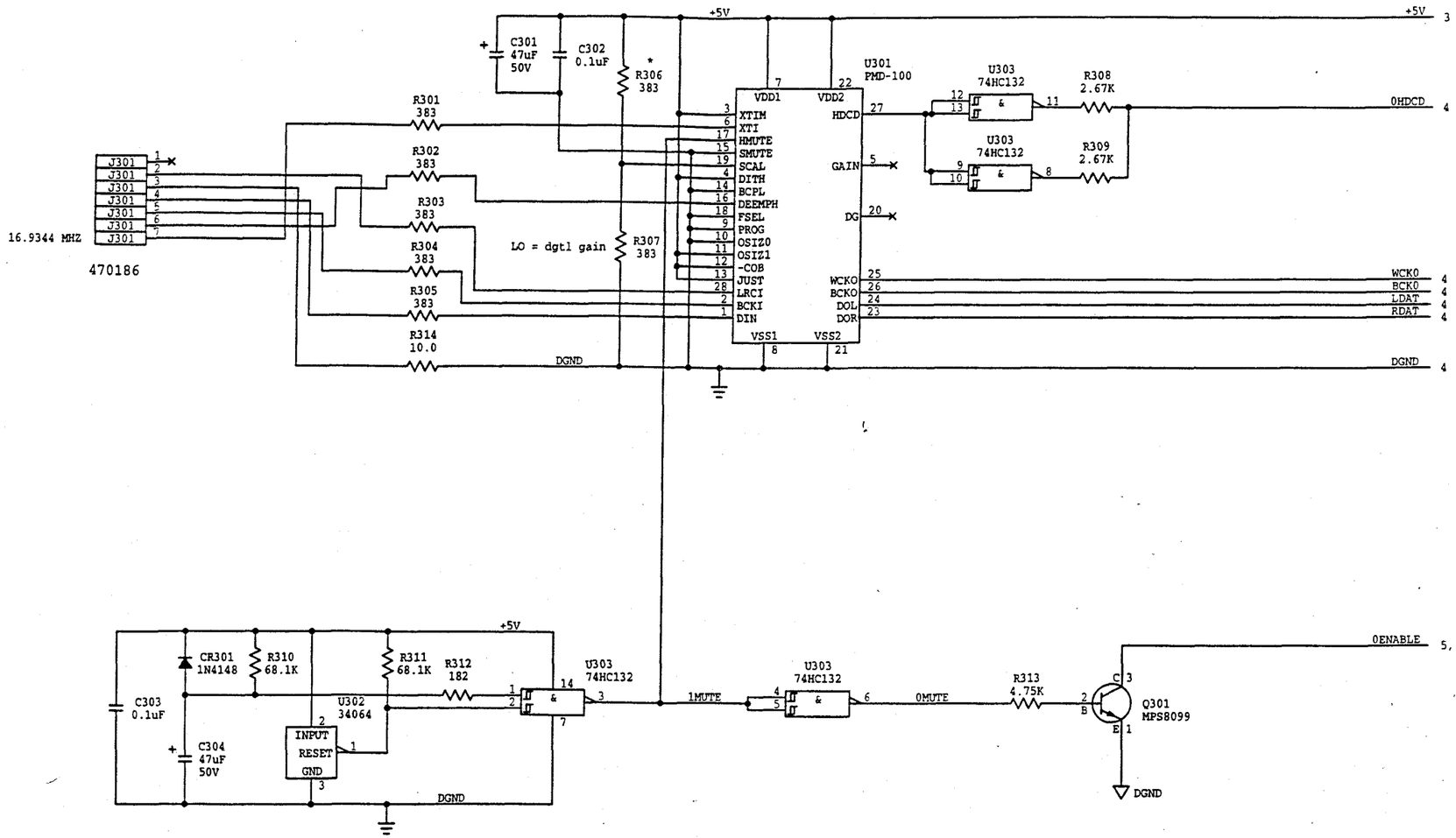
R214 383

R213 681

CR202 STANDBY RED

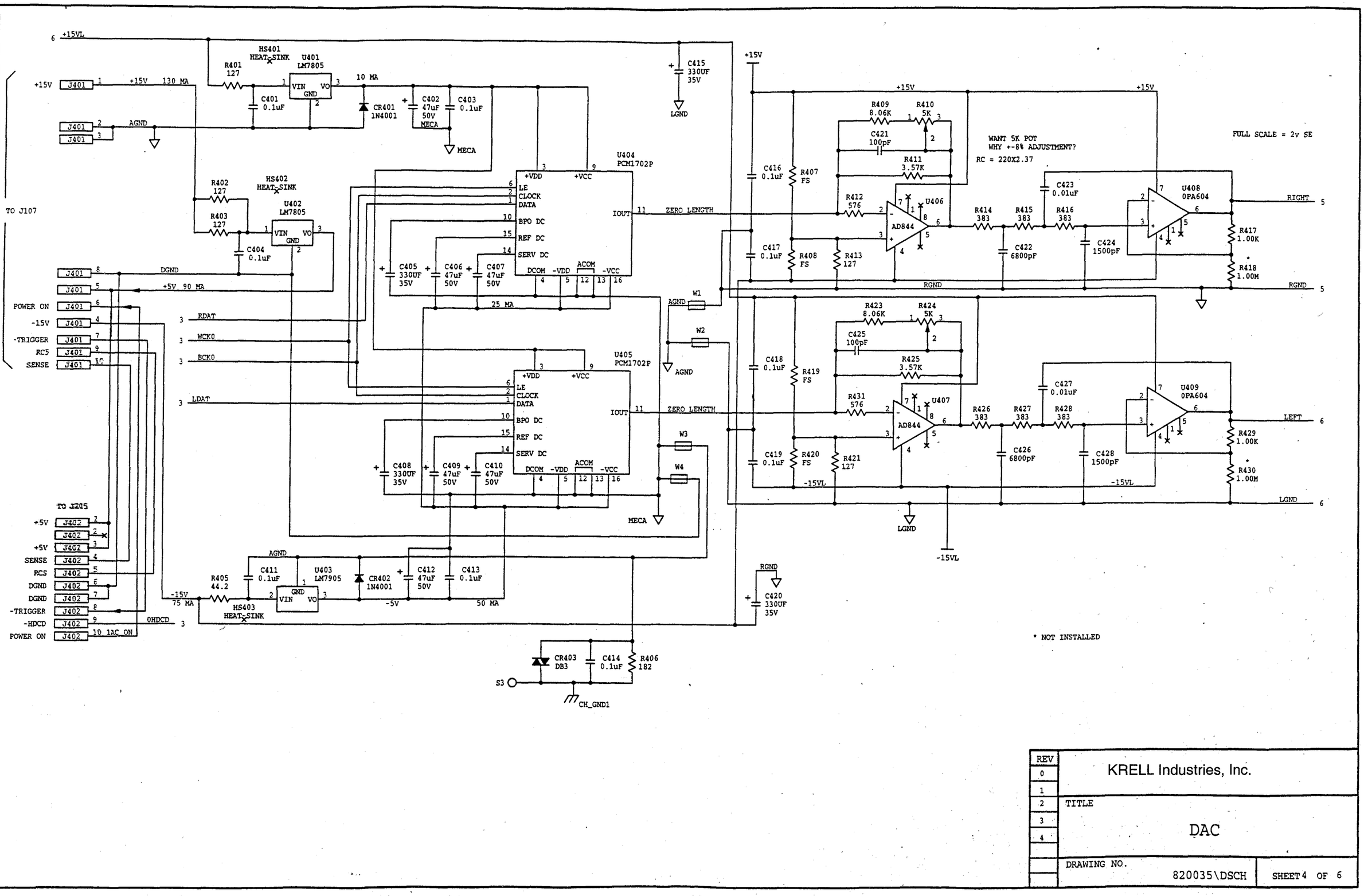
CR203 POWER BLU

REV	KRELL Industries, Inc.
0	
1	
2	TITLE: FRONT PANEL
3	
4	
	DRAWING NO. 820035\DSCH — SHEET 2 OF 6

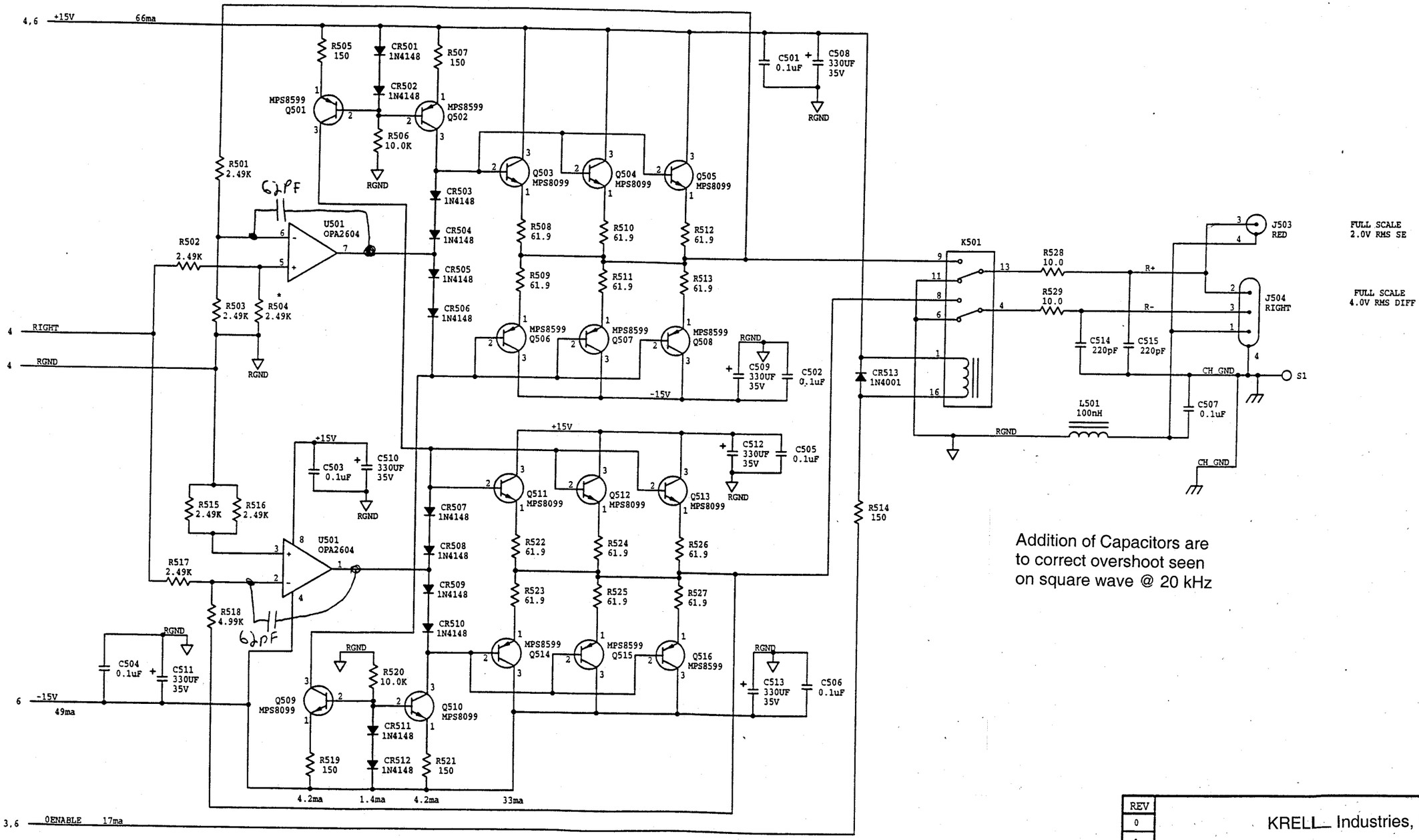


* NOT INSTALLED

REV	
0	KRELL Industries, Inc.
1	
2	TITLE
3	I/O & HDCD
4	
	DRAWING NO. 820035\DSCH — SHEET 3 OF 6

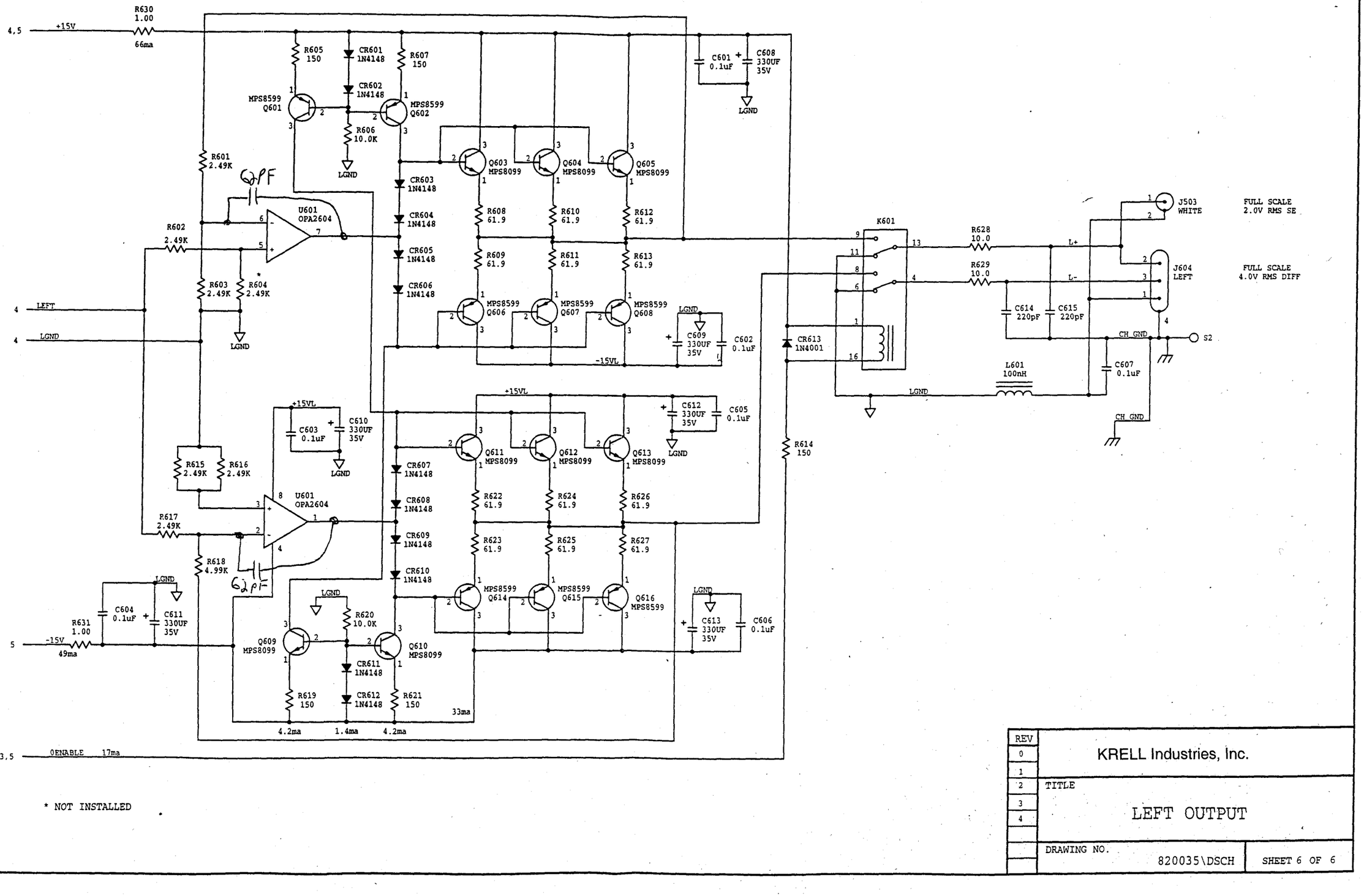


REV	KRELL Industries, Inc.
0	
1	
2	TITLE
3	DAC
4	
	DRAWING NO. 820035\DSCH
	SHEET 4 OF 6



* NOT INSTALLED

REV	
0	KRELL Industries, Inc.
1	
2	TITLE
3	RIGHT OUTPUT
4	
	DRAWING NO. 8200 35\DSCH — SHEET 5 OF 6



* NOT INSTALLED

REV	KRELL Industries, Inc.	
0		
1		
2	TITLE	
3	LEFT OUTPUT	
4		
	DRAWING NO. 820035\DSCH	SHEET 6 OF 6

Sub Assembly Part No	Sub Assembly Description	Component No	Component Description	Qty Per	Sub Assembly Level	Reference Designators							
I990095	KAV-250cd	I910959500100	KAV-250cd PARTS SUPPLI	1	1								
I990095	KAV-250cd	I990095950100	KAV-250cd PARTS BOUGHT	1	1								
I910959500100	KAV-250cd PARTS SUPPLI	I422601000060	HDCD FILTER PMD100	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I49000004022	SMALL LED-BLUE	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I580055000044	REMOTE W/ RECIEVER	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I701110200790	2 METER 2 COND. 26AWG	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I76121100033	KRC-3 END CAP	2	2								
I910959500100	KAV-250cd PARTS SUPPLI	I78702400001	KAV-300i BUTTON	7	2								
I910959500100	KAV-250cd PARTS SUPPLI	I840904400230	CLS-440-2 PEM NUT	6	2								
I910959500100	KAV-250cd PARTS SUPPLI	I869595000095	SANYO TRAN/P FOR 250cd	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I920330950140	KAV-250cd TRIMPLATE	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I920540950105	KAV-250cd FACEPLATE	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I94000000000	WARRANTY CARD ALL PROD	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I960100000100	COMPLIMENTARY CARD	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I960101700095	KAV-250 cd OWNERS MANA	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I960601900195	KAC-250cd ENVELOPE	1	2								
I910959500100	KAV-250cd PARTS SUPPLI	I96095950001	KAV-250cd INTRO LETTER	1	2								
I990095950100	KAV-250cd PARTS BOUGHT	I91095950200	KAV-250 cd SHIPPING	1	2								
I920330950140	KAV-250cd TRIMPLATE	I920000950140	KAV-250cd TRIMPLATE	1	3								
I920540950105	KAV-250cd FACEPLATE	I920900950105	KAV-250cd FACEPLATE	1	3								
I920900950105	KAV-250cd FACEPLATE	I920000950105	KAV-250 cd FACEPLATE	1	4								