APx500 Series
audio analyzers

Service Manual

Audio precision

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Safety

Safety Information

Do NOT service or repair this equipment unless properly qualified. Servicing should be performed only by a qualified technician or an authorized Audio Precision distributor.

Do NOT defeat the safety ground connection. This equipment is designed to operate only with an approved three-conductor power cord and safety grounding. Loss of the protective grounding connection can result in electrical shock hazard from the accessible conductive surfaces of this equipment.

Do NOT exceed mains voltage ratings. This equipment is designed to operate only from a 50–60 Hz ac mains power source at 100–240 Vac nominal voltage. The mains supply voltage is not to exceed ±10 % of nominal (90–264 Vac).

For continued fire hazard protection, fuses should be replaced ONLY with the exact value and type indicated on the rear panel of the instrument.

The International Electrotechnical Commission (IEC 1010-1) requires that measuring circuit terminals used for voltage or current measurement be marked to indicate their Measurement Category. The Measurement Category is based on the amplitude of transient or impulse voltage that can be expected from the ac power distribution network. This product is classified as Measurement Category I, abbreviated "CAT I" on the instrument front panel, and it should not be used within Categories II, III, or IV. It is intended to be used for the measurement of audio signals only. The maximum input rating at the measurement terminals is 230 Vpk / 160 Vrms for the APx525 Family, and 160 Vpk / 115 Vrms for the APx585 Family (dc to 20 kHz).

Do NOT substitute parts or make any modifications without the written approval of Audio Precision. Doing so may create safety hazards. Using this product in a manner not specified by Audio Precision can result in a safety hazard.

This product is for indoor use—Installation Category II, Measurement Category I, Pollution Degree 2.

Safety Symbols

The following symbols may be marked on the panels or covers of equipment or modules, and are used in this manual:

WARNING!—This symbol alerts you to a potentially hazardous condition, such as the presence of dangerous voltage that could pose a risk of electrical shock. Refer to the accompanying Warning Label or Tag, and exercise extreme caution.

ATTENTION!—This symbol alerts you to important operating considerations or a potential operating condition that could damage equipment. If you see this marked on equipment, refer to the Operator's Manual or User's Manual for precautionary instructions.

FUNCTIONAL EARTH TERMINAL—A terminal marked with this symbol is electrically connected to a reference point of a measuring circuit or output and is intended to be earthed for any functional purpose other than safety.

PROTECTIVE EARTH TERMINAL—A terminal marked with this symbol is bonded to conductive parts of the instrument and is intended to be connected to an external protective earthing system.

Disclaimer

Audio Precision cautions against using their products in a manner not specified by the manufacturer. To do otherwise may void any warranties, damage equipment, or pose a safety risk to personnel.

Section 1: General Information

1.1 Introduction

This service package supports the Audio Precision APx500 Series audio analyzers. Sufficient information and tools are provided to enable a qualified technician to perform adjustments and diagnostic self tests. This manual covers the APx525, 526, 555, 582, 585, and 586 instruments. Model designations APx520 and 521 are no longer used for new products—when servicing these instruments refer to the APx525 and 526 respectively instead.

General service information in this package also applies to the APx515; information specific to the APx515 can be found in Section 8.

The service package download contains this manual, as well as all the necessary adjustment and Self Test projects. The adjustment projects require a specific version of the APx500 measurement software, which is noted in the accompanying Readme.txt file. If this version is different than the version you are currently running, it may be installed concurrently in a separate directory.

1.2 Adjustment and Self Test

Adjustment is a procedure that directs you to adjust variable components in one or more instrument modules to achieve optimum performance.

Self Tests are diagnostic procedures that use the instrument's own analyzer section to indicate passing or failing performance in each of its measurement functions.

1.3 Calibration CANNOT be performed with this service package

Calibration requires specific testing equipment and procedures to verify the performance of a device against published specifications.

Accredited calibration adds a further degree of rigor to the testing process, incorporating review of quality system documentation as well as an on-site assessment by an independent agency. Contact Audio Precision or your AP sales partner for information about accredited calibration services.

1.4 Repair Authorization

The field repair of any APx500 Series circuit board assembly or module is NOT authorized except under very special circumstances. Defective modules or assemblies will be replaced through your local Audio Precision distributor or our USA factory. See Section 2 for a brief synopsis of the modules and assemblies contained in the APx500 Series instruments.

1.5 Schematics and Design Documentation

Audio Precision considers many of the circuit designs used in the APx500 Series of instruments to be proprietary and state-of-the-art. In the event that Audio Precision authorizes a field repair to one of the modules, only information sufficient to locate and replace the defective component(s) will be provided. No other schematics or design related information will be released.

1.6 The System

Each Audio Precision APx500 Series instrument functions in a system, controlled by a PC running APx500 measurement software. The PC communicates with the instrument over a USB cable connection.

Section 2: Functional Modules

2.1 Introduction

The APx500 Series is completely modular in construction. This makes troubleshooting and repair faster and easier. The following describes the major modules and assemblies in the instrument, in order to facilitate a basic understanding of the function and layout. The locations of the modules in the instrument are shown in Section 3. The APx500 Series models that use each module are indicated in brackets.

2.2 Common Modules

2.2.1 BPWR Power Supply Module

The power supply takes the ac line input voltage and converts it to various dc voltages for distribution within the instrument. A wide input range eliminates the need for an ac voltage selection switch. The power supply is located in a self-contained enclosure, located in the rear of the instrument, which can easily be removed. If a failure is diagnosed to the power supply, the entire module will be swapped for another. There are no user-serviceable parts inside [All models].

2.2.2 BRIO Distribution Backplane

Mounted to the horizontal chassis plate that internally divides the top and bottom halves of the instrument. It contains multi-pin connectors that most of the other circuit board modules mount to, as well as circuitry for interfacing and distributing signals between the modules. The backplane also contains the +16 Vdc regulators, and LEDs that indicate the proper operation of each of the different power supply voltages [All models].

2.2.3 BSL2 Advanced Master Clock Module

Generates clock and synchronization signals that are used throughout the system, primarily for the generation of synchronized audio sample rates and jitter [APx555 (optional on others)].

2.2.4 BSOL Master Clock Module

Generates clock and synchronization signals that are used throughout the system, primarily for the generation of synchronized audio sample rates [APx525, 526, 582, 585, 586].

2.2.5 BSRP Advanced Master Clock Rear Panel

Rear panel with sync and trigger connectors [APx555 (optional on others)].

2.2.6 BVIV Power LED Module

Holds the LED that lights up the front panel AP logo when the power to the instrument is turned on [All models].

2.2.7 BZOD CPU / USB Module

Contains the CPU and the USB interface that carries communications between the APx instrument and the PC running the APx500 measurement software [All models].

2.3 Analog Output Modules

2.3.1 B4AO Analog Output Module (High Performance 2-chan)

Contains the analog generator and output circuitry for two channels. This is a large board that resides on the left side of the chassis plate in the top half of the instrument [APx555].

2.3.2 B4SG Analog Sine Generator Module

High Performance Analog Sine Generator. Mounts over the B4AO Analog Output module [APx555].

2.3.3 BLED Analog I/O LED Module (8-chan)

Holds the eight LEDs and the D-sub connector on the analog input and output panels [APx585, 586].

2.3.4 BMEG Analog Output Module (2-chan)
Contains the analog generator and output circuitry for two channels. This is a large board that resides on the left side of the chassis plate in the top half of the instrument [APx525, 526, 582].

2.3.5 BOFP Analog Output LED Module (2-chan)
Holds two LEDs and the XLR output connectors on the front panel [APx525, 526, 555, 582].

2.3.6 BPLX Analog Output Module (8-chan)
Contains the analog generator and the output circuitry for eight channels. This is a large board that resides on the left side of the chassis plate in the top half of the instrument [APx585, 586].

2.3.7 BSAT AG52 Analog Generator Module (2-chan) (option)
Adds an analog square wave generator. Additionally, it increases the maximum output level, improves THD+N, and adds DIM measurement capability (combined square wave and sine wave stimulus signal) [APx525, 526, 582].

2.4 Analog Input Modules

2.4.1 B4AI Analog Input Module (High Performance 2-chan)
Contains the analog analyzers and input circuitry for two channels. This is a large board that resides on the right side of the chassis plate in the top half of the instrument [APx555].

2.4.2 B4BR Analog Band Reject Module
Analog Band Reject module for the High Performance Analyzer capability. Mounts over the B4AI Analog Input module [APx555].

2.4.3 BCAS Analog Input Module (8-chan)
Contains the analog analyzers and input circuitry for eight channels. This is a large board that resides on the right side of the chassis plate in the top half of the instrument. On the APx586, there is a second BCAS module in the bottom half [APx582, 585, 586].

2.4.4 BIFP Analog Input LED Module (2-chan)
Holds two LEDs and the XLR input connectors on the front panel [APx525, 526, 555].

2.4.5 BLED Analog I/O LED Module (8-chan)
Holds the eight LEDs and the D-sub connector on the analog input and output panels [APx582, 585, 586].

2.4.6 BOTA Analog Input Module (2-chan)
Contains the analog analyzers and input circuitry for two channels. This is a large board that resides on the right side of the chassis plate in the top half of the instrument. On the APx521 and 526, there is a second BOTA module in the bottom half [APx525, 526].

2.4.7 BROT BW52 Ultra-high Bandwidth Analyzer Module (2-chan) (option)
Extends the analog measurement bandwidth from 90 kHz out to 1 MHz [APx525, 526].

2.5 Digital I/O Modules

2.5.1 BADI Advanced Digital I/O Module
Provides digital I/O to the instrument, via the various connectors on the BDIF panel [APx555].

2.5.2 BAES Digital I/O Module
Provides digital I/O to the instrument, via the various connectors on the BSOP panel [APx525, 526, 582, 585, 586].

2.5.3 BAZL/BAZW Bluetooth Module (option)
Provides Bluetooth connectivity. The BAZW wideband version has different firmware but the board is the same [APx525, 526, 555, 582, 585, 586].

2.5.4 BDIF Advanced Digital I/O Panel
Contains balanced, unbalanced, and optical digital signal connectors. Internal cables carry signals from BDIF to BADI [APx555].

2.5.5 BDIO Digital Serial I/O Panel (option)
Provides digital serial I/O via 4 DB15 connectors mounted on a single-width panel. Connects

internally to BDSA [APx525, 526, 555, 582, 585, 586].

2.5.6 BDSA Digital Serial I/O Module (option)

Contains the circuitry that adds serial digital I/O capability [APx525, 526, 555, 582, 585, 586].

2.5.7 BMPA Digital Serial I/O Panel Upper (option)

Contains connectors and circuitry for the upper two DB15 connectors [APx525, 526, 555, 582, 585, 586].

2.5.8 BPDF PDM Panel (option)

Provides front panel LEDs and BNC connectors [APx525, 526, 555, 582, 585, 586].

2.5.9 BPDM PDM Module (option)

Provides PDM I/O, with data, clock, and power connectors [APx525, 526, 555, 582, 585, 586].

2.5.10 BSFP Digital I/O Panel

Contains balanced, unbalanced, and optical digital signal connectors. Internal cables carry signals from BSFP to BAES [APx525, 526, 582, 585, 586].

2.5.11 BSOP Digital I/O Panel (obsolete)

Contains balanced, unbalanced, and optical digital signal connectors in a double-width panel. Internal cables carry signals from BSOP to BAES [APx525, 526, 582, 585, 586].

2.5.12 BTFP Bluetooth Panel (option)

Provides front panel LEDs and Bluetooth antenna connectivity [APx525, 526, 555, 582, 585, 586].

2.5.13 BVID HDMI Module (option)

Provides HDMI front panel connections. It also decodes HDMI audio, and contains the video signal generator [APx525, 526, 555, 582, 585, 586].

2.5.14 BSIR, BDIO.BT, BDIO.PDM Combination DIO Modules (option)

Combination DIO/Serial IO, DIO/BT, and DIO/PDM modules (obsolete) [APx525, 526, 582, 585, 586].

2.6 Connector Revisions and BERT Adapter

Earlier APx modules used Type M connectors for internal module interconnection. When the Type M connectors were no longer available, all modules and chassis were revised to use Type E connectors. The BERT adapter allows Type E modules to be mounted in a Type M chassis.

Table 1: Functional Modules Matrix

COMMON:		APx525	APx526	APx555	APx582	APx585	APx586
BPWR	Power Supply	X	X	X	X	X	X
BRIO	Distribution Backplane	X	X	X	X	X	X
BSL2	Advanced Master Clock	O	O	X			
BSOL	Master Clock	X	X		X	X	X
BSRP	Advanced Master Clock Panel	O	O	X			
BVIV	Power LED	X	X	X	X	X	X
BZOD	CPU/USB	X	X	X	X	X	X
ANALOG OUTPUT:							
B4AO	Analog Output (High Perf)			X			
B4SG	Analog Sine Generator			X			
BLED	Analog I/O LED					X	X
BMEG	Analog Output (2-chan)	X	X		X		
BOFP	Analog Output LED	X	X	X	X		
BPLX	Analog Output (8-chan)					X	X
BSAT	AG52 Analog Generator	O	O		X		
ANALOG INPUT:							
B4AI	Analog Input (High Perf)			X			
B4BR	Analog Band Reject			X			
BCAS	Analog Input (8-chan)				X	X	X
BIFP	Analog Input LED	X	X	X			
BLED	Analog I/O LED				X	X	X
BOTA	Analog Input (2-chan)	X	X				
BROT	BW52 Ultra-high Bandwidth Analyzer	O	O				

Key: X=Present O=Option

CONTINUED ON NEXT PAGE

Table 1: Functional Modules Matrix (continued)

DIGITAL I/O:		APx525	APx526	APx555	APx582	APx585	APx586
BADI	Advanced Digital I/O	O	O	X	O	O	O
BAES	Digital I/O	X	X		X	X	X
BAZL / BAZW	Bluetooth	O	O	O	O	O	O
BDIF	Advanced Digital I/O Panel	O	O	X	O	O	O
BDIO	Digital Serial I/O Panel	O	O	O	O	O	O
BDSA	Digital Serial I/O	O	O	O	X	O	O
BMPA	Digital Serial I/O Panel Upper	O	O	O	O	O	O
BPDF	PDM Panel	O	O	O	O	O	O
BPDM	PDM	O	O	O	O	O	O
BSFP	Digital I/O Panel	X	X		X	X	X
BSOP	Digital I/O Panel (obs)	X	X		X	X	X
BTFP	Bluetooth Panel	O	O	O	O	O	O
BVID	HDMI	O	O	O	O	O	O

Key: X=Present O=Option

Section 3: Mechanical Diagrams

3.1 Introduction

This section contains selected mechanical drawings and replaceable parts lists for the APx instrument. Unless otherwise specified, all dimensions are in inches. When ordering a replacement part, please include the instrument model and serial number, in addition to the Audio Precision part number and item description.

Abbreviations Used in the Mechanical Parts Lists

"	Inch	**INTF**	Interface
#	Number or size	**I/O**	Input/output
A	Ampere	**LED**	Light emitting diode
AL	Aluminum	**M**	Male
ANLR	Analyzer	**MC**	Machine
ASSY	Assembly	**M/F**	Male/female
AUX	Auxiliary	**MOD**	Module
BAN	Banana	**MON**	Monitor
BGE	Beige	**MT**	Mount
BLK	Black	**PAN**	Pan head
BO	Black oxide	**PC**	Printed circuit
BZ	Black zinc	**PH**	Phillips
COND	Conductor	**PNL**	Panel
CONN	Connector	**POLY**	Polyethylene
CONT	Continuous	**PSA**	Pressure sensitive adhesive
C&S	Cut and strip	**RBN**	Ribbon
D-SUB	D-subminiature	**RND**	Round
ECB	Etched circuit board	**RT**	Right
EL	Electro-luminescent	**SEM**	SEMS captive washer
F	Female	**SHLD**	Shield
FLT	Flat head	**SS**	Stainless steel
Ga	Gauge	**TF**	Thread forming
GEN	Generator	**THRD**	Thread or threaded
GNDED	Grounded	**TRS**	Truss head
GRY	Grey	**VSEL**	Voltage selector
HDWR	Hardware	**W/**	With
HEX	Hexagonal	**W/O**	Without
INSUL	Insulated	**XFMR**	Transformer
INT	Internal	**ZN**	Zinc

Table 3-1: Covers

ITEM	PART NO.	DESCRIPTION	QTY
1	7110.0300	COVER, BOTTOM	1
2	7150.0300	COVER, TOP	1
3	5630.0011	FOOT, BLACK .25 X .5 POLYASTERMER	4
	5630.0001	FOOT, BLACK SIDE .5 X .5 X .25	4
4	5112.1108.7	SCREW FLT PH 100 DEG ZN 4-40 X 1/4 BLK (REV 1 CHASSIS)	28
4	5112.1108.8	SCREW FLT PH 100 DEG ZN 4-40 X 1/4 GREY (REV 0 CHASSIS)	(28)
5	5112.1108.2	SCREW FLT PH 100 DEG ZN 4-40 X 1/4	6
6	5113.7112	SCREW MC SEM PH ZN 6-32 X 3/8	4
	HAN-APX	HANDLE (COMPLETE ASSY)	1
	5810.0004	HANDLE STRAP	1
	7310.0028	HANDLE BRACKET	2
	5515.0004	HANDLE SPACER	2
	5115.1116.2	SCREW FLT PH BLK 10-32 X 1/2 (REV 1 CHASSIS)	2
	5115.1116.6	SCREW FLT PH DGY 10-32 X 1/2 (REV 0 CHASSIS)	(2)

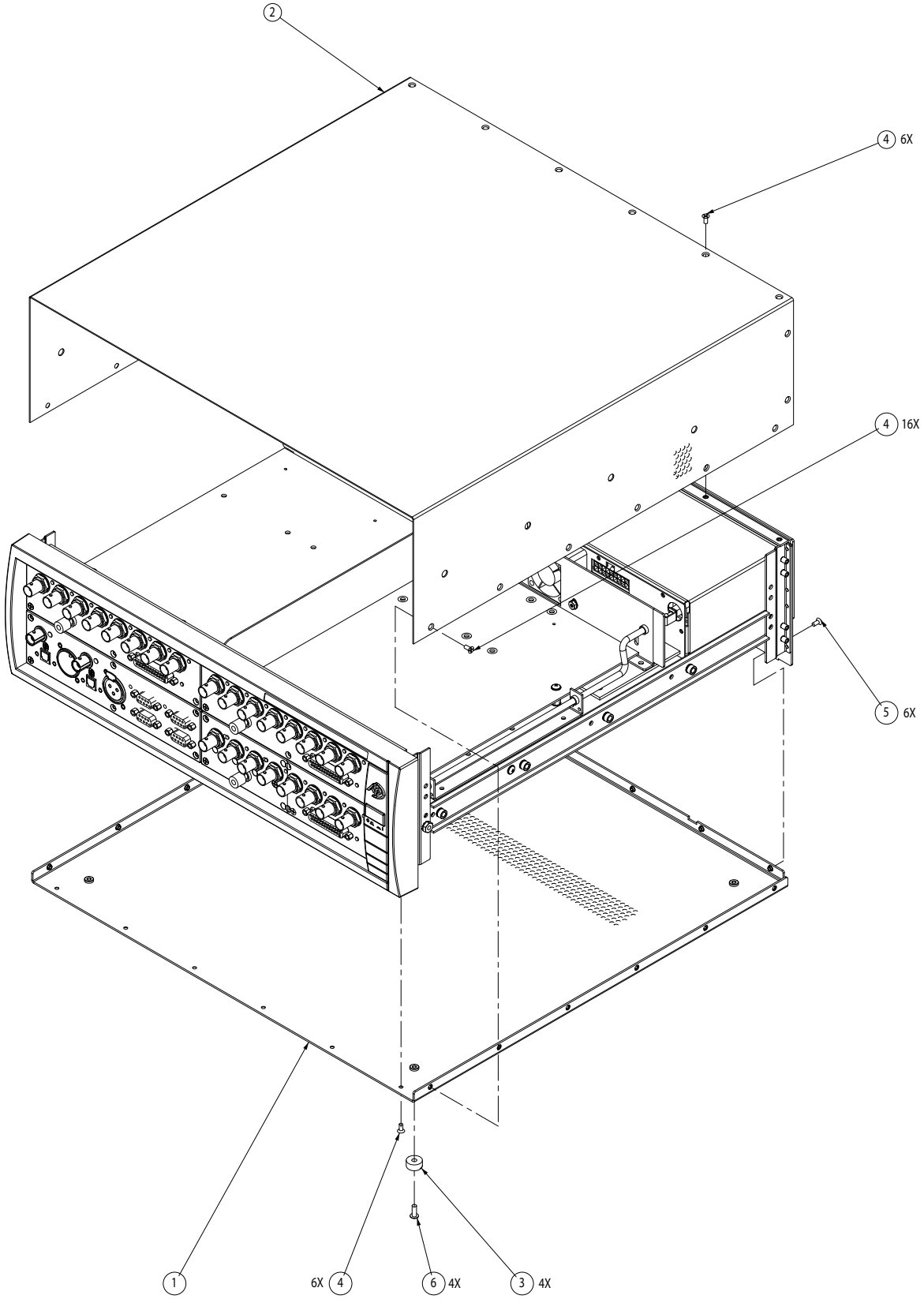


Figure 3-1 Covers

Table 3-2: Chassis Rev 0

ITEM	PART NO	DESCRIPTION	QTY
1	7130.0101	PLATE, ADAPTER, FRONT PANEL	1
2	7400.0030	CASTING, FRONT PANEL	1
3	7310.0040	BRACE, VERT, FRONT	2
4	7310.0038	BRACKET, DIVIDER, ANALOG	1
5	7311.0001	BRACE, LEFT, HORIZ, CHASSIS	1
6	7310.0041	BRACE, VERTICAL, REAR	2
7	BRIO.0000	INTERCONNECT BOARD	1
8	4800.1250	FAN, 1.25 X 1.1 D 3" WIRES 24V	1
9	7310.0035	BRACKET, FAN, BULKHEAD	1
10	7140.0300	PANEL, REAR	1
11	BPWR.0000	POWER SUPPLY MODULE	1
12	7320.0026	CLIP, ATTACHMENT, POWER ROD	1
13	7311.0002	BRACE, RIGHT, HORIZ., CHASSIS	1
14	5670.0002	ROD, ACTUATION, POWER	1
15	BLOG.0000	FRONT SWITCH PANEL	1
16	5222.0001	NUT, KEP 4-40	22
17	5113.7108	SCREW MC SEM PH ZN 6-32 X 1/4	16
18	5112.3108	SCREW MC SEM PH ZN 4-40 X 1/4	8
19	5223.0001	NUT, KEP 6-32	10
20	5113.1108.8	SCREW, FLAT, ZINC, 6-32 X 1/4 X 100DEG	8
21	5113.7112	SCREW, PH, 6-32 X 3/8	5
22	5112.3144	SCREW, PH, 4-40 X 1 + 3/8	4
23	5112.1108.2	SCREW, FLAT, ZINC, 4-40 X 1/4	14
24	5112.3112	SCREW MC SEM PH ZN 4-40 X 3/8	3
25	5346.0002	WASHER, SHOULDER #4	2
26	5544.2233	BUSHING GUIDE NYLON .218 ID X .234 H	3

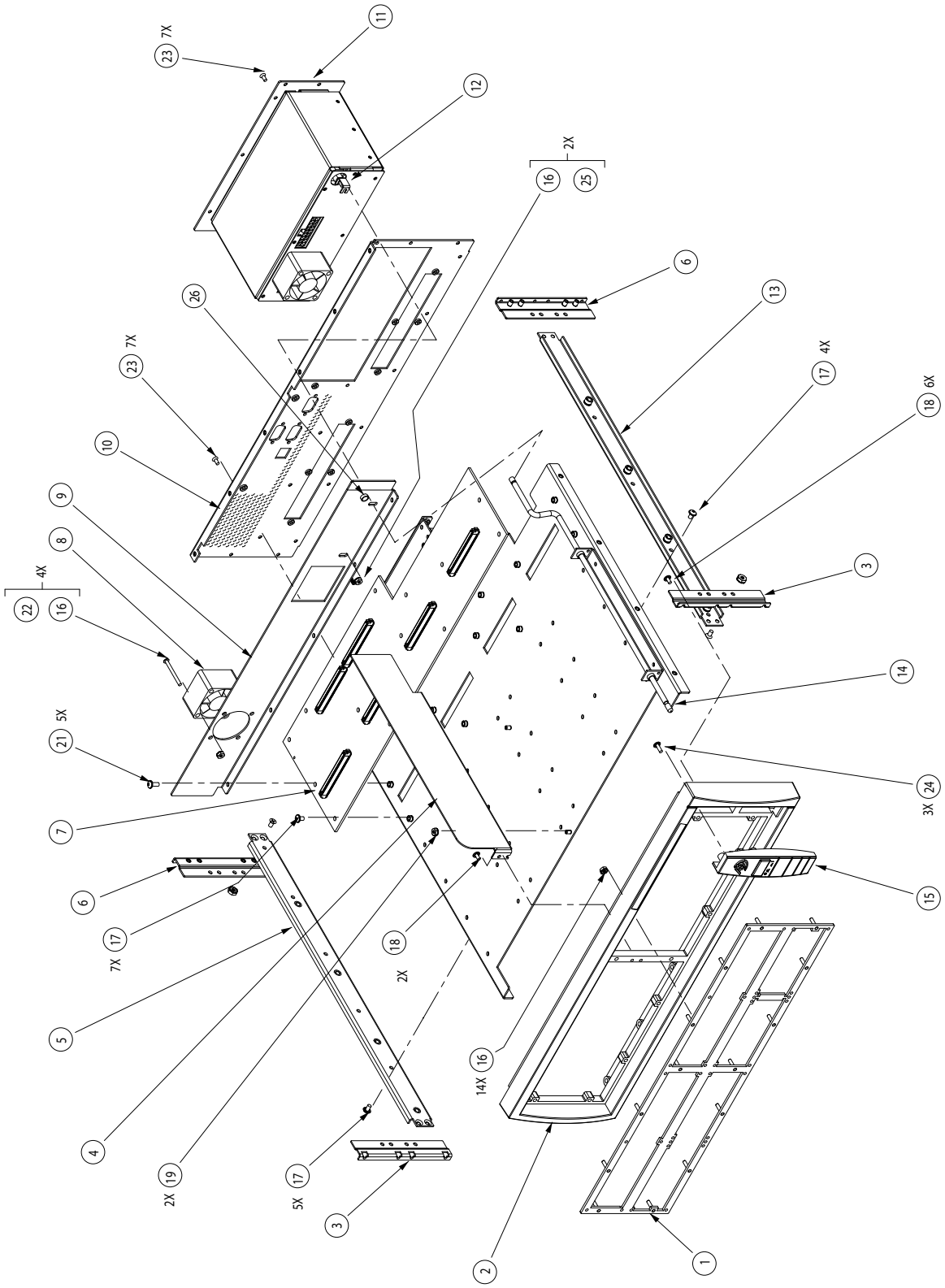


Figure 3-2 Chassis Rev 0

Table 3-3: Chassis Rev 1

ITEM	PART NO	DESCRIPTION	QTY
1	7130.0101	PLATE, ADAPTER, FRONT PANEL	1
2	7400.0030	CASTING, FRONT PANEL	1
4	7310.0038	BRACKET, DIVIDER, ANALOG	1
5	7311.0001	BRACE, LEFT, HORIZ, CHASSIS	1
7	BRIO.0000	INTERCONNECT BOARD	1
8	4800.1250	FAN, 1.25 X 1.1 D 3" WIRES 24V	1
9	7310.0035	BRACKET, FAN, BULKHEAD	1
10	7140.0310	PANEL, REAR	1
11	BPWR.0000	POWER SUPPLY MODULE	1
12	7320.0026	CLIP, ATTACHMENT, POWER ROD	1
13	7311.0002	BRACE, RIGHT, HORIZ, CHASSIS	1
14	7159.0001	BAR, ACTUATION, POWER	1
	5610.0004	HEAT SHRINK, 1 X 1/4	1
	5620.0101	GROMMET	1
15	BLOG.0000	FRONT SWITCH PANEL	1
16	5222.0001	NUT, KEP 4-40	22
17	5113.7108	SCREW MC SEM PH ZN 6-32 X 1/4	16
18	5112.3108	SCREW MC SEM PH ZN 4-40 X 1/4	8
19	5223.0001	NUT, KEP 6-32	10
20	5113.1108.8	SCREW, FLAT, ZINC, 6-32 X 1/4 X 100DEG	8
21	5113.7112	SCREW, PH, 6-32 X 3/8	5
22	5112.3144	SCREW, PH, 4-40 X 1 + 3/8	4
23	5112.1108.2	SCREW, FLAT, ZINC, 4-40 X 1/4	14
24	5112.3112	SCREW MC SEM PH ZN 4-40 X 3/8	3
25	5346.0002	WASHER, SHOULDER #4	2
26	5544.2233	BUSHING GUIDE NYLON .218 ID X .234 H	3
27	5112.3112	SCREW MACH PAN PH ZN 4-40 X 3/8	2
28	5317.0003	WASHER, FLAT 3/16 ID X 3/8	2
	4255.0002	JACK, BANANA GNDED KNURLED (REAR PANEL)	1

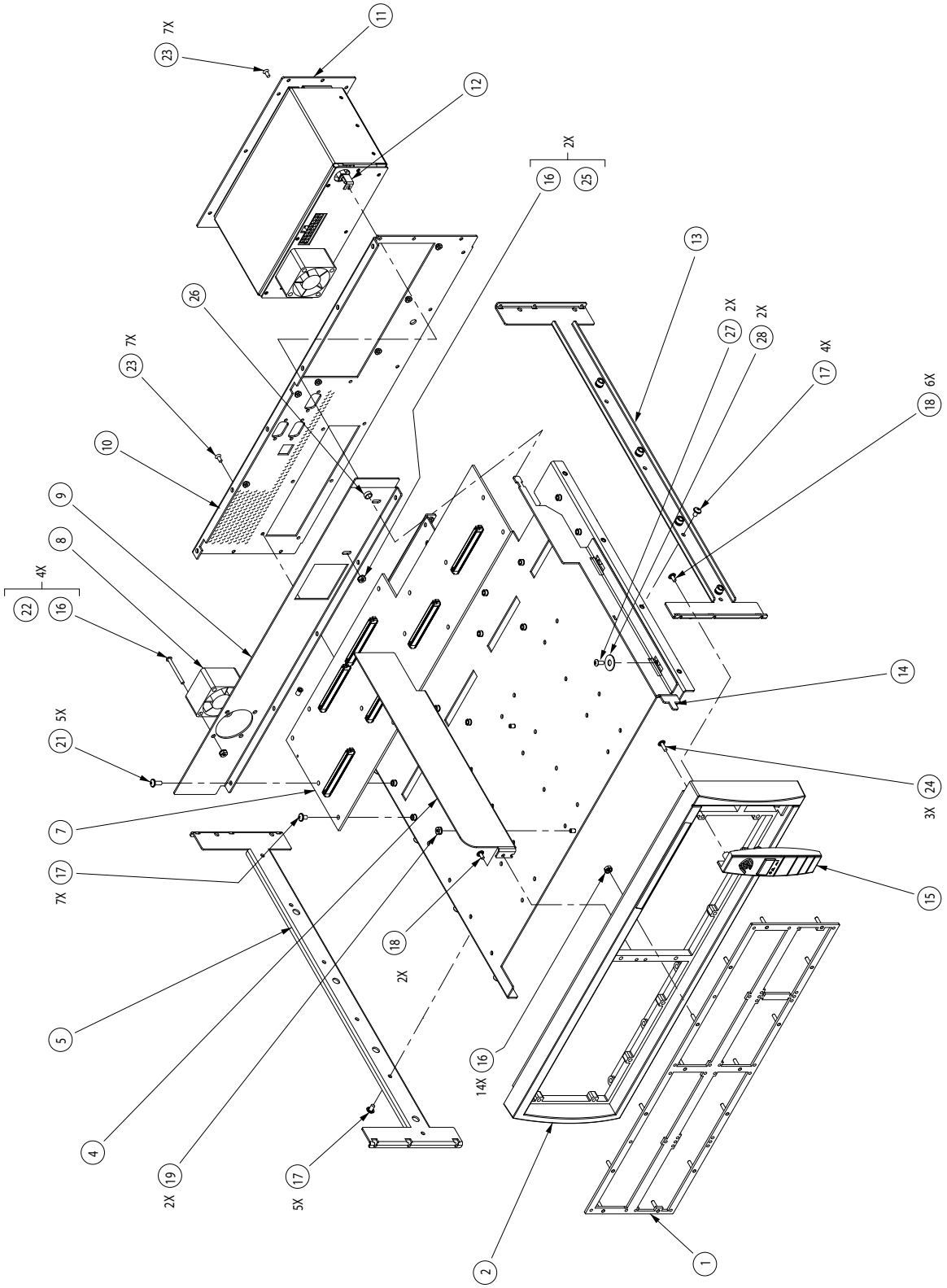


Figure 3-3 Chassis Rev 1

Table 3-4: Front and Rear Panels (2-chan).

ITEM	PART NO	DESCRIPTION	QTY
1	BAOU.2000	ANALOG OUTPUT PANEL (2-CHAN) (SEE FIGURE 3-14)	1
2	BAIN.2000	ANALOG INPUT PANEL (2-CHAN) (SEE FIGURE 3-16)	1
2A	BAIN.3000	ANALOG INPUT PANEL CHANNELS 3&4 (2-CHAN) (APX526 ONLY) (SEE FIGURE 3-16)	(1)
3	BDFP.0000	ADV DIGITAL IO PANEL (SEE FIGURE 3-18)	(1)
	BSPS.0000	DIGITAL IO PANEL (SEE FIGURE 3-19)	(1)
4	7134.0136	PANEL, BLANK, SMALL (QTY AS NEEDED)	(0-4)
5	BHDM.0000	HDMI I/O PANEL (OPTIONAL) (SEE FIGURE 3-25) AND (SEE FIGURE 3-26)	(1)
6	BTFP.0000	BLUETOOTH I/O PANEL (OPTIONAL) (SEE FIGURE 3-27)	(1)
7	BDIO.0000	DIGITAL SERIAL I/O PANEL (OPTIONAL) (SEE FIGURE 3-29)	(1)
8	BPDF.0000	PDM I/O PANEL (OPTIONAL) (SEE FIGURE 3-28)	(1)
9	BSLR.0000	ADV MASTER CLOCK REAR PANEL	(1)
	7134.0150	PLATE, BLANK, REAR (REV 1 CHASSIS)	(1)
10	7134.0130	PLATE, BLANK, REAR (REV 0 CHASSIS)	2
11	5112.1108.7	SCREW FLT PH 100 DEG AN 4-40 X 1/4 BLACK (REV 1 CHASSIS)	24-28
	5112.1108.8	SCREW FLT PH 100 DEG AN 4-40 X 1/4 GREY (REV 0 CHASSIS)	(24-28)
12	5112.1108.2	SCREW FLT PH 100 DEG ZN 4-40 X 1/4 (REV 1 CHASSIS)	6
13	5112.3108	SCREW MC SEM PH ZN 4-40 X 1/4 (REV 0 CHASSIS)	(8)

Option quantities are shown in parentheses.

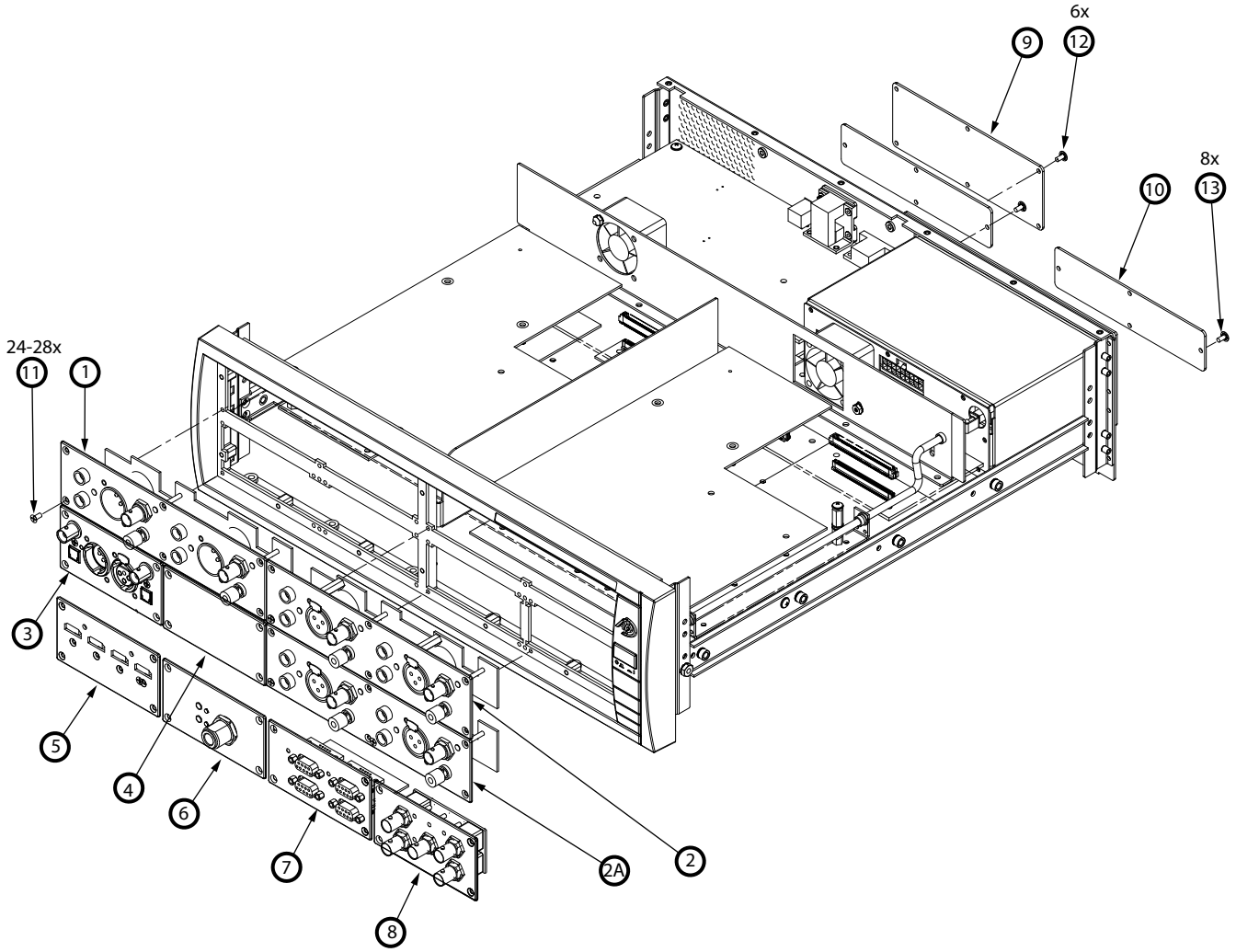


Figure 3-4 Front and Rear Panels (2-chan)

Table 3-5: Front and Rear Panels (8-chan).

ITEM	PART NO	DESCRIPTION	QTY
1	BAOU.0000	ANALOG OUTPUT PANEL (8-CHAN) (SEE FIGURE 3-14)	1
2	BAIN.0000	ANALOG INPUT PANEL (8-CHAN) (SEE FIGURE 3-16)	1
2A	BAIN.1600	ANALOG INPUT PANEL CHANNELS 9-16 (8-CHAN) (APX586 ONLY) (SEE FIGURE 3-16)	(1)
3	BDFP.0000	ADV DIGITAL IO PANEL (SEE FIGURE 3-18)	(1)
	BSPS.0000	DIGITAL IO PANEL (SEE FIGURE 3-19)	(1)
4	7134.0136	PANEL, BLANK, SMALL (QTY AS NEEDED)	(0-4)
5	BHDM.0000	HDMI I/O PANEL (OPTIONAL) (SEE FIGURE 3-25) AND (SEE FIGURE 3-26)	(1)
6	BTFP.0000	BLUETOOTH I/O PANEL (OPTIONAL) (SEE FIGURE 3-27)	(1)
7	BDIO.0000	DIGITAL SERIAL I/O PANEL (OPTIONAL) (SEE FIGURE 3-29)	(1)
8	BPDF.0000	PDM I/O PANEL (OPTIONAL) (SEE FIGURE 3-28)	(1)
9	BSLR.0000	ADV MASTER CLOCK REAR PANEL	(1)
	7134.0150	PLATE, BLANK, REAR (REV 1 CHASSIS)	(1)
10	7134.0130	PLATE, BLANK, REAR (REV 0 CHASSIS)	2
11	5112.1108.7	SCREW FLT PH 100 DEG AN 4-40 X 1/4 BLACK (REV 1 CHASSIS)	24-28
	5112.1108.8	SCREW FLT PH 100 DEG AN 4-40 X 1/4 GREY (REV 0 CHASSIS)	(24-28)
12	5112.1108.2	SCREW FLT PH 100 DEG ZN 4-40 X 1/4 (REV 1 CHASSIS)	6
13	5112.3108	SCREW MC SEM PH ZN 4-40 X 1/4 (REV 0 CHASSIS)	(8)

Option quantities are shown in parentheses.

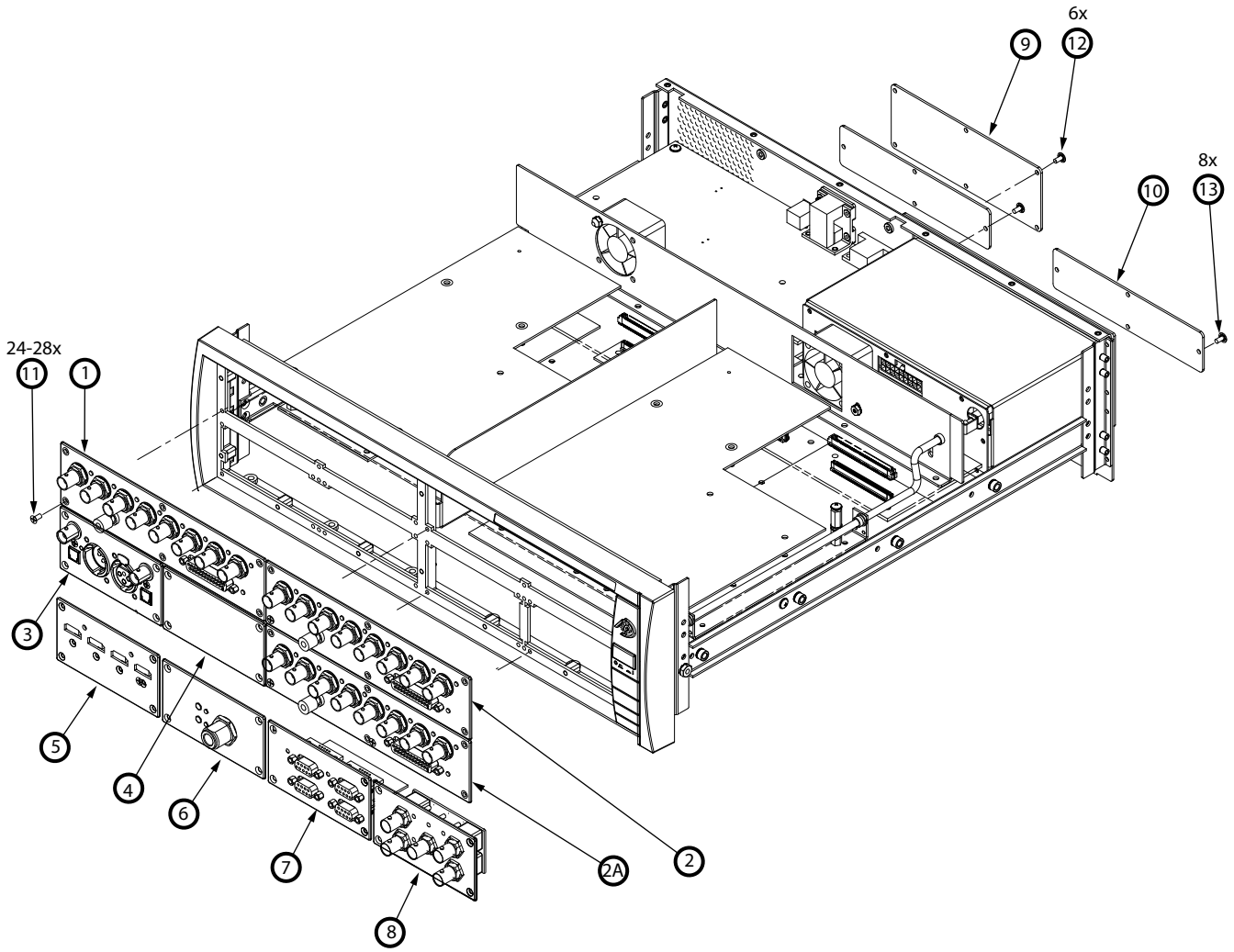


Figure 3-5 Front and Rear Panels (8-chan)

Table 3-6: Rack Mount

ITEM	PART NO	DESCRIPTION	QTY
	RAK-585	RACK MOUNT, SLIDING (COMPLETE ASSY)	1
1	7171.0001	RACK SLIDE (INCLUDES SCREWS) (SET)	1
	7310.0014	BRACKETS (PR)	1
	8211.0240	RACK MOUNT INSTRUCTIONS	1

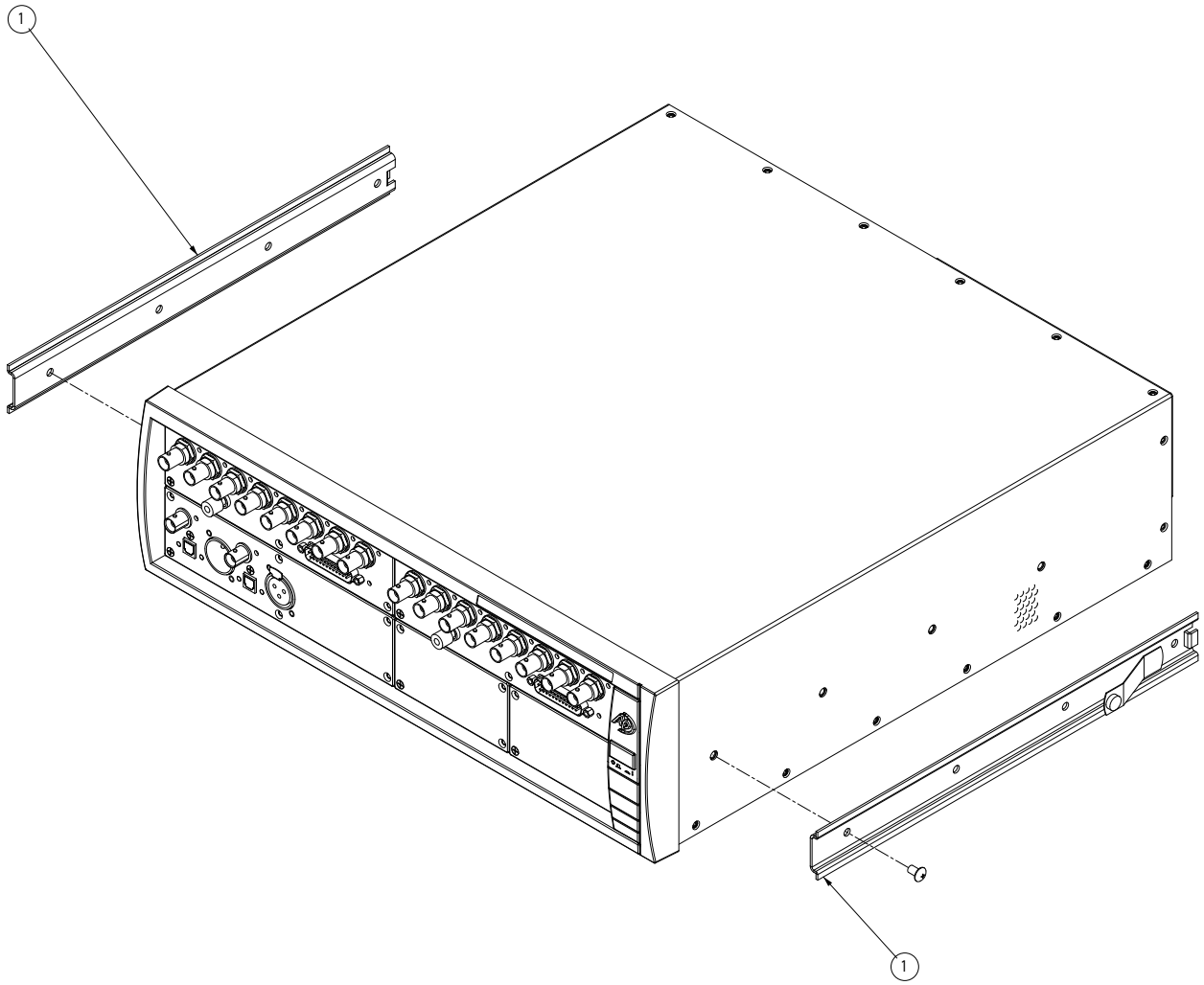


Figure 3-6 Rack Mount

Table 3-7: Circuit Boards (top view) (APx525/526)

ITEM	PART NO	DESCRIPTION	QTY
1	BMEG.0000	ANALOG OUTPUT BOARD ASSY (2-CHAN)	1
2	BZOD.0000	CPU BOARD ASSY	1
3	BOTA.0000	ANALOG INPUT BOARD ASSY (2-CHAN)	1
3A	BOTA.0000	ANALOG INPUT BOARD ASSY CHANNELS 3&4 (2-CHAN) (APX521 AND 526 ONLY)	(1)
4	BAES.0000	DIGITAL I/O BOARD ASSY (APX525 AND 526 ONLY)	1
5	BSOL.0000	SYSTEM CLOCK BOARD ASSY (SEE BOTTOM VIEW)	1
6	5113.7108	SCREW MC SEM PH ZN #6-32 X 1/4	49
7	5323.0001	WASHER LOCK #6	22
8	5535.1250	STANDOFF HEX F/F 6-32 X .25 X .5 STL/ZN	22
9	5533.1250	STANDOFF HEX M/F 6-32 X .25 X .5 STL/ZN	4
10	5534.1031	STANDOFF HEX M/F 6-32 X .312 STL/ZN	1
11	5532.1106.1	STANDOFF HEX M/F JACK SCREW	6
12	BSAT.0000	AG52 ANALOG GENERATOR OPTION BOARD ASSY	1
13	BROT.0000	BW52 HIGH BANDWIDTH OPTION BOARD ASSY	1
14	BRIO.0000	INTERCONNECT BOARD	1

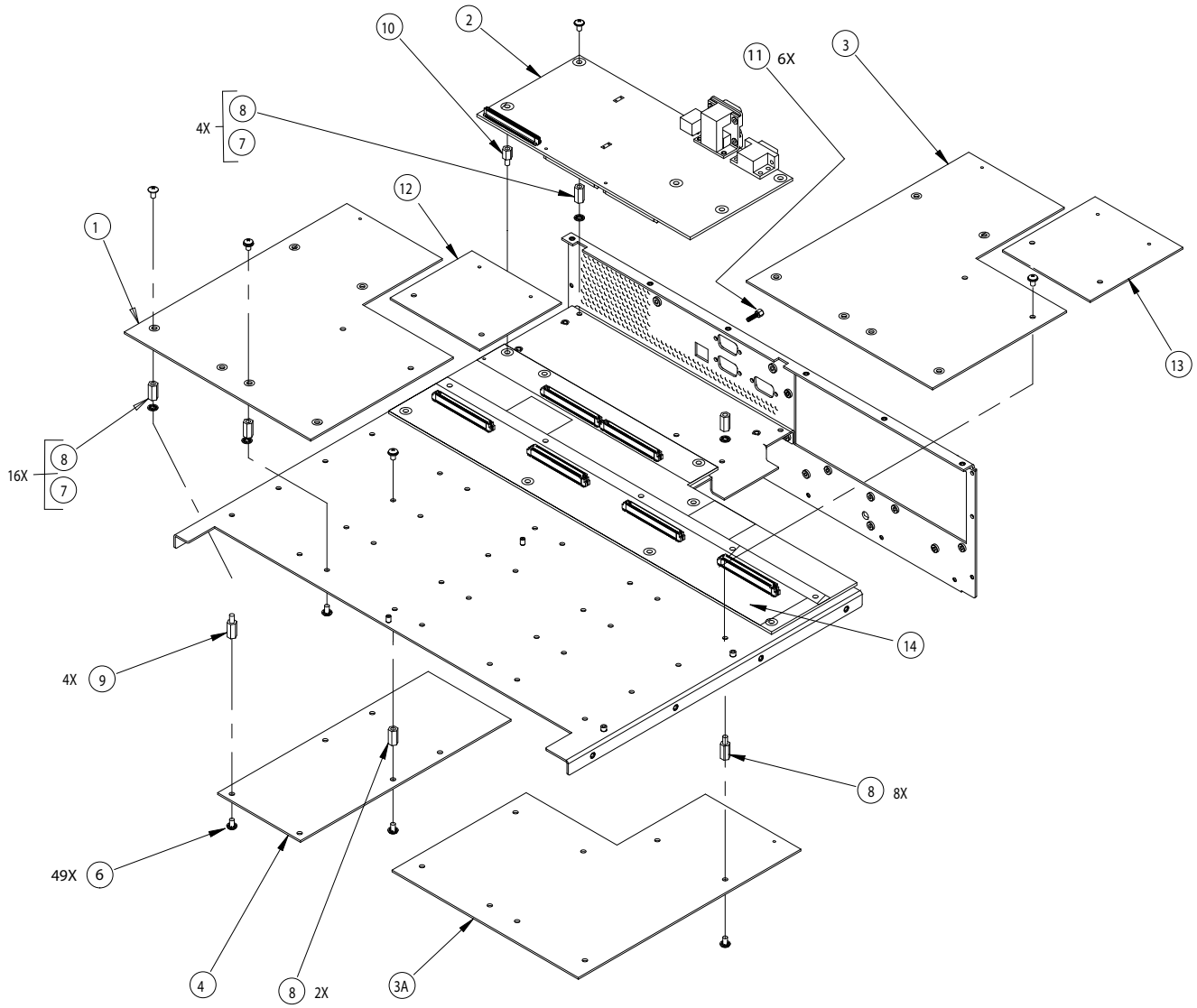


Figure 3-7 Circuit Boards (top view) (APx525/526)

Table 3-8: Circuit Boards (bottom view) (APx525/526)

ITEM	PART NO	DESCRIPTION	QTY
1	BMEG.0000	ANALOG OUTPUT BOARD ASSY (2-CHAN)	1
2	BZOD.0000	CPU BOARD ASSY	1
3	BOTA.0000	ANALOG INPUT BOARD ASSY (2-CHAN)	1
3A	BOTA.0000	ANALOG INPUT BOARD ASSY CHANNELS 3&4 (2-CHAN) (APX521 AND 526 ONLY)	(1)
4	BAES.0000	DIGITAL I/O BOARD ASSY (APX525 AND 526 ONLY)	(1)
5	BSOL.0000	SYSTEM CLOCK BOARD ASSY	1
6	5113.7108	SCREW MC SEM PH ZN #6-32 X 1/4	49
7	5323.0001	WASHER LOCK #6	22
8	5535.1250	STANDOFF HEX F/F 6-32 X .25 X .5 STL/ZN	22
9	5533.1250	STANDOFF HEX M/F 6-32 X .25 X .5 STL/ZN	4
10	5534.1031	STANDOFF HEX M/F 6-32 X .312 STL/ZN	1
11	5532.1106.1	STANDOFF HEX M/F JACK SCREW (SEE TOP VIEW)	6
12	BSAT.0000	AG52 ANALOG GENERATOR OPTION BOARD ASSY	1
13	BROT.0000	BW52 HIGH BANDWIDTH OPTION BOARD ASSY	1
14	BRIO.0000	INTERCONNECT BOARD (SEE TOP VIEW)	1

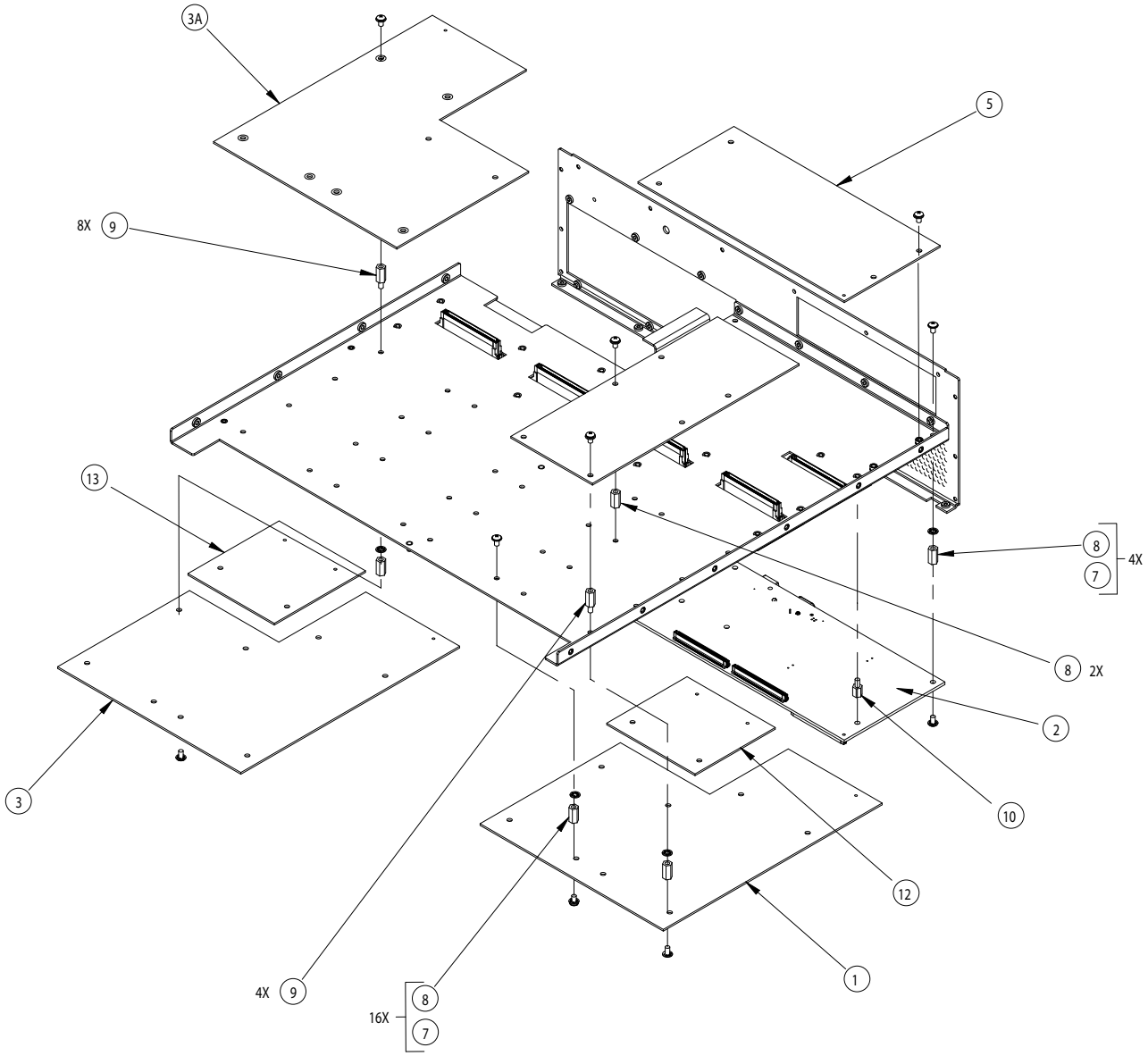


Figure 3-8 Circuit Boards (bottom view) (APx525/526)

Table 3-9: Circuit Boards (top view) (APx555)

ITEM	PART NO	DESCRIPTION	QTY
1	B4AO.0000	ANALOG OUTPUT BOARD ASSY (2-CHAN HP)	1
2	BZOD.0000	CPU BOARD ASSY	1
3	B4AI.0000	ANALOG INPUT BOARD ASSY (2-CHAN HP)	1
4	BADI.0000	DIGITAL I/O BOARD ASSY	1
5	BSL2.0000	SYSTEM CLOCK BOARD ASSY (SEE BOTTOM VIEW)	1
5A	BSLR.0000	ADVANCED MASTER CLOCK REAR PANEL ASSY (SEE BOTTOM VIEW)	1
6	5113.7108	SCREW MC SEM PH ZN #6-32 X 1/4	49
7	5323.0001	WASHER LOCK #6	22
8	5535.1250	STANDOFF HEX F/F 6-32 X .25 X .5 STL/ZN	22
9	5533.1250	STANDOFF HEX M/F 6-32 X .25 X .5 STL/ZN	4
10	5534.1031	STANDOFF HEX M/F 6-32 X .312 STL/ZN	1
11	5532.1106.1	STANDOFF HEX M/F JACK SCREW	6
12	B4SG.0000	ANALOG SINE GENERATOR	1
13	B4BR.0000	ANALOG BAND REJECT FILTER	1
14	BRIO.0000	INTERCONNECT BOARD	1

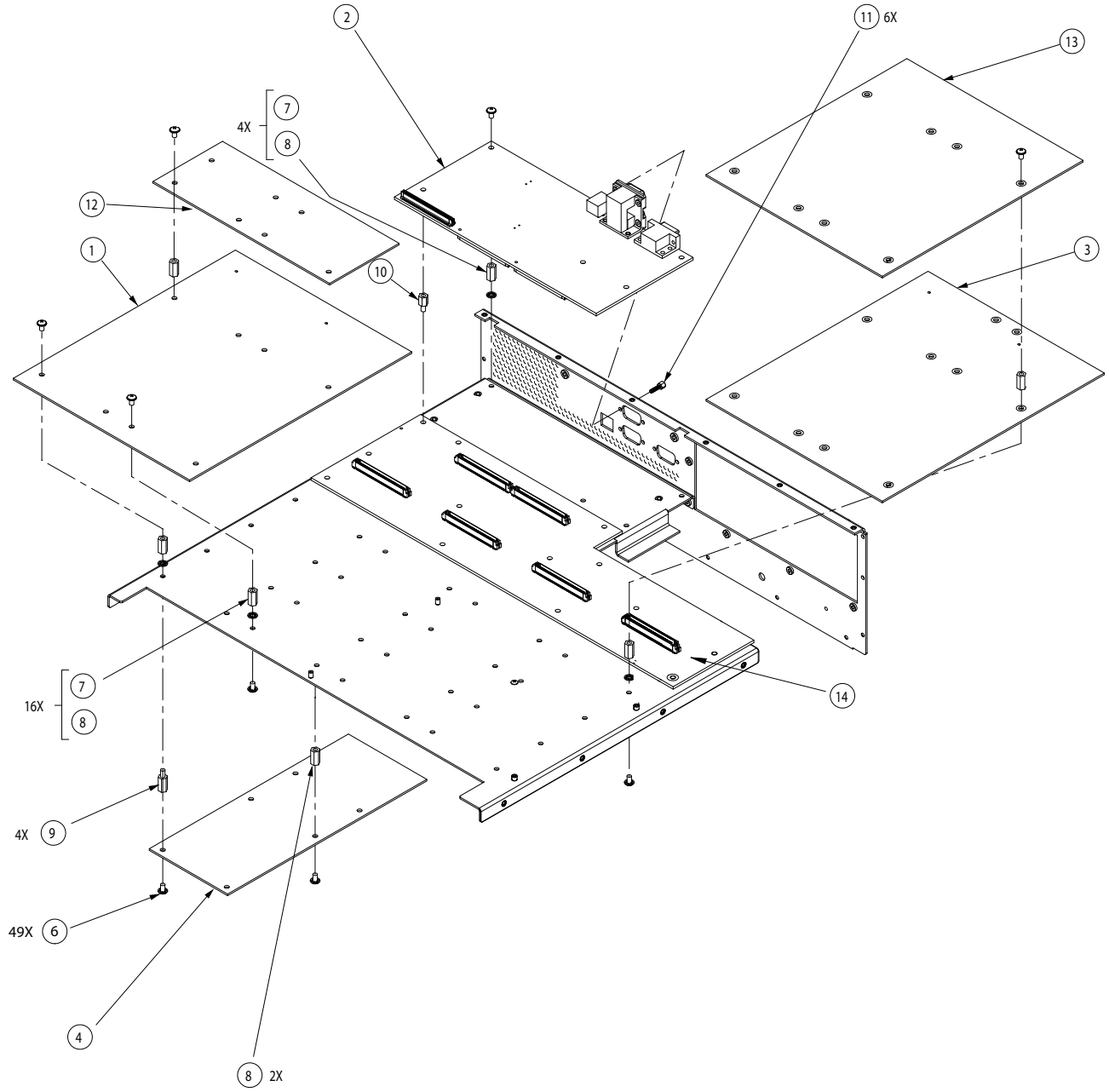


Figure 3-9 Circuit Boards (top view) (APx555)

Table 3-10: Circuit Boards (bottom view) (APx555)

ITEM	PART NO	DESCRIPTION	QTY
1	B4AO.0000	ANALOG OUTPUT BOARD ASSY (2-CHAN HP)	1
2	BZOD.0000	CPU BOARD ASSY	1
3	B4AI.0000	ANALOG INPUT BOARD ASSY (2-CHAN HP)	1
4	BADI.0000	DIGITAL I/O BOARD ASSY	1
5	BSL2.0000	SYSTEM CLOCK BOARD ASSY	1
5A	BSLR.0000	ADVANCED MASTER CLOCK REAR PANEL ASSY	1
6	5113.7108	SCREW MC SEM PH ZN #6-32 X 1/4	49
7	5323.0001	WASHER LOCK #6	22
8	5535.1250	STANDOFF HEX F/F 6-32 X .25 X .5 STL/ZN	22
9	5533.1250	STANDOFF HEX M/F 6-32 X .25 X .5 STL/ZN	4
10	5534.1031	STANDOFF HEX M/F 6-32 X .312 STL/ZN	1
11	5532.1106.1	STANDOFF HEX M/F JACK SCREW (SEE TOP VIEW)	6
12	B4SG.0000	ANALOG SINE GENERATOR	1
13	B4BR.0000	ANALOG BAND REJECT FILTER	1
14	BRIO.0000	INTERCONNECT BOARD (SEE TOP VIEW)	1

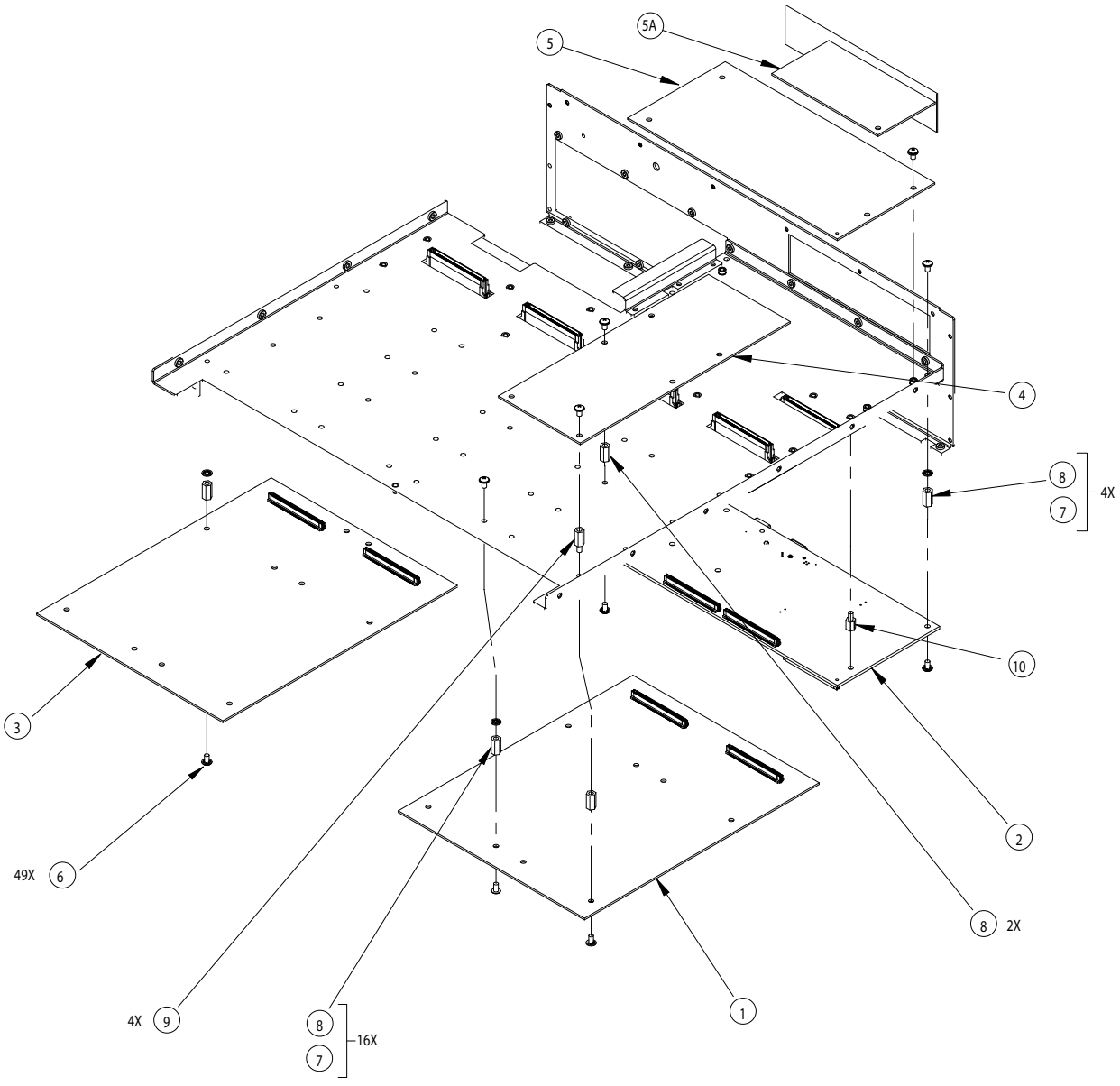


Figure 3-10 Circuit Boards (bottom view) (APx555)

Table 3-11: Circuit Boards (top view) (8-chan)

ITEM	PART NO	DESCRIPTION	QTY
1	BPLX.0000	ANALOG OUTPUT BOARD ASSY (8-CHAN)	1
2	BZOD.0000	CPU BOARD ASSY	1
3	BCAS.0000	ANALOG INPUT BOARD ASSY (8-CHAN)	1
3A	BCAS.0000	ANALOG INPUT BOARD ASSY CHANNELS 9-16 (8-CHAN) (APX586 ONLY)	(1)
4	BAES.0000	DIGITAL I/O BOARD ASSY	1
5	BSOL.0000	SYSTEM CLOCK BOARD ASSY (SEE BOTTOM VIEW)	1
6	5113.7108	SCREW MC SEM PH ZN #6-32 X 1/4	49
7	5323.0001	WASHER LOCK #6	22
8	5535.1250	STANDOFF HEX F/F 6-32 X .25 X .5 STL/ZN	22
9	5533.1250	STANDOFF HEX M/F 6-32 X .25 X .5 STL/ZN	4
10	5534.1031	STANDOFF HEX M/F 6-32 X .312 STL/ZN	1
11	5532.1106.1	STANDOFF HEX M/F JACK SCREW	6
12	BRIO.0000	INTERCONNECT BOARD	1

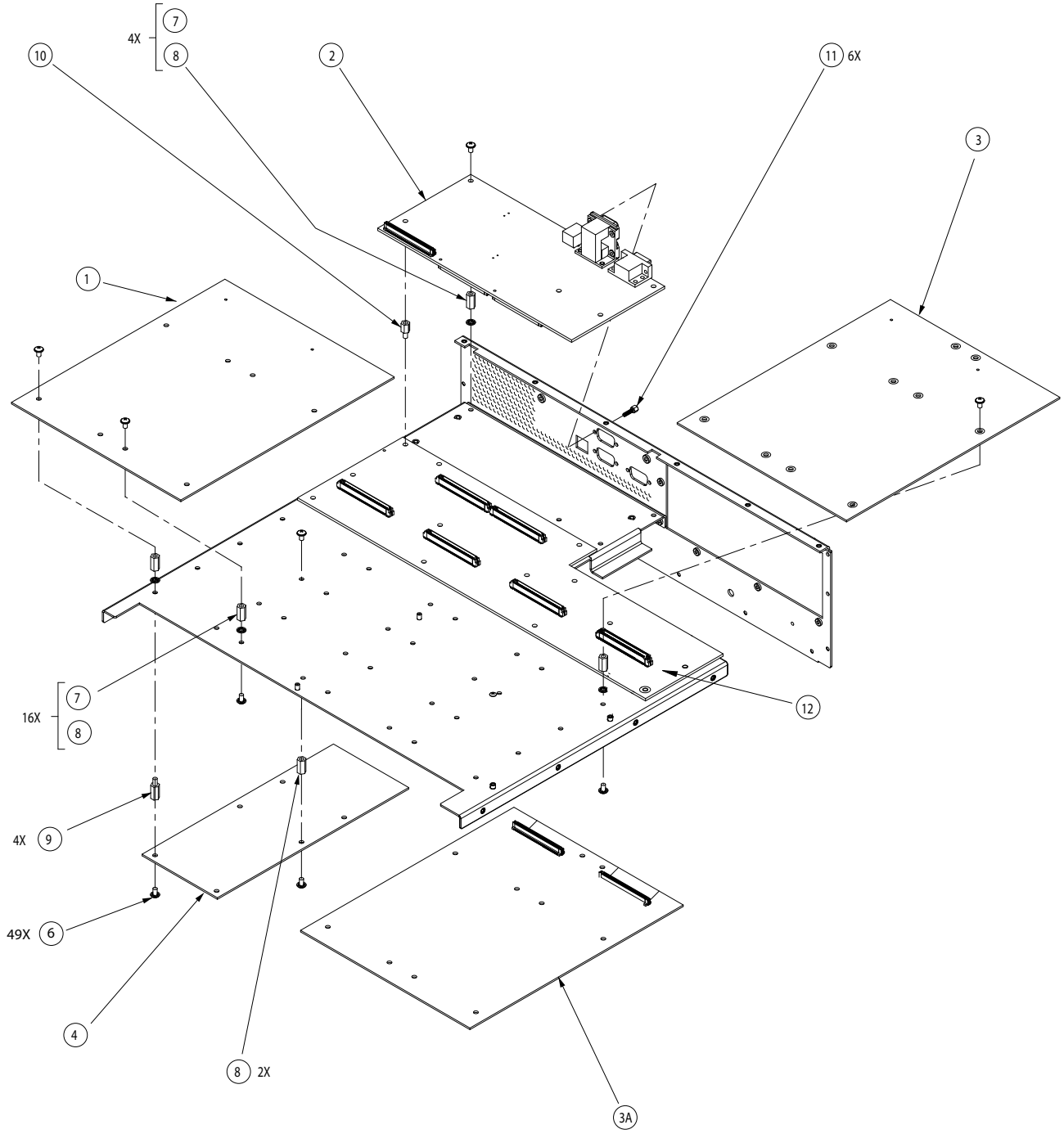


Figure 3-11 Circuit Boards (top view) (8-chan)

Table 3-12: Circuit Boards (bottom view) (8-chan)

ITEM	PART NO	DESCRIPTION	QTY
1	BPLX.0000	ANALOG OUTPUT BOARD ASSY	1
2	BZOD.0000	CPU BOARD ASSY	1
3	BCAS.0000	ANALOG INPUT BOARD ASSY	1
3A	BCAS.0000	ANALOG INPUT BOARD ASSY (FOR CHAN 9-16) (APX586 ONLY)	(1)
4	BAES.0000	DIGITAL I/O BOARD ASSY	1
5	BSOL.0000	SYSTEM CLOCK BOARD ASSY	1
6	5113.7108	SCREW MC SEM PH ZN #6-32 X 1/4	49
7	5323.0001	WASHER LOCK #6	22
8	5535.1250	STANDOFF HEX F/F 6-32 X .25 X .5 STL/ZN	22
9	5533.1250	STANDOFF HEX M/F 6-32 X .25 X .5 STL/ZN	4
10	5534.1031	STANDOFF HEX M/F 6-32 X .312 STL/ZN	1
11	5532.1106.1	STANDOFF HEX M/F JACK SCREW (SEE TOP VIEW)	6
12	BRIO.0000	INTERCONNECT BOARD (SEE TOP VIEW)	1

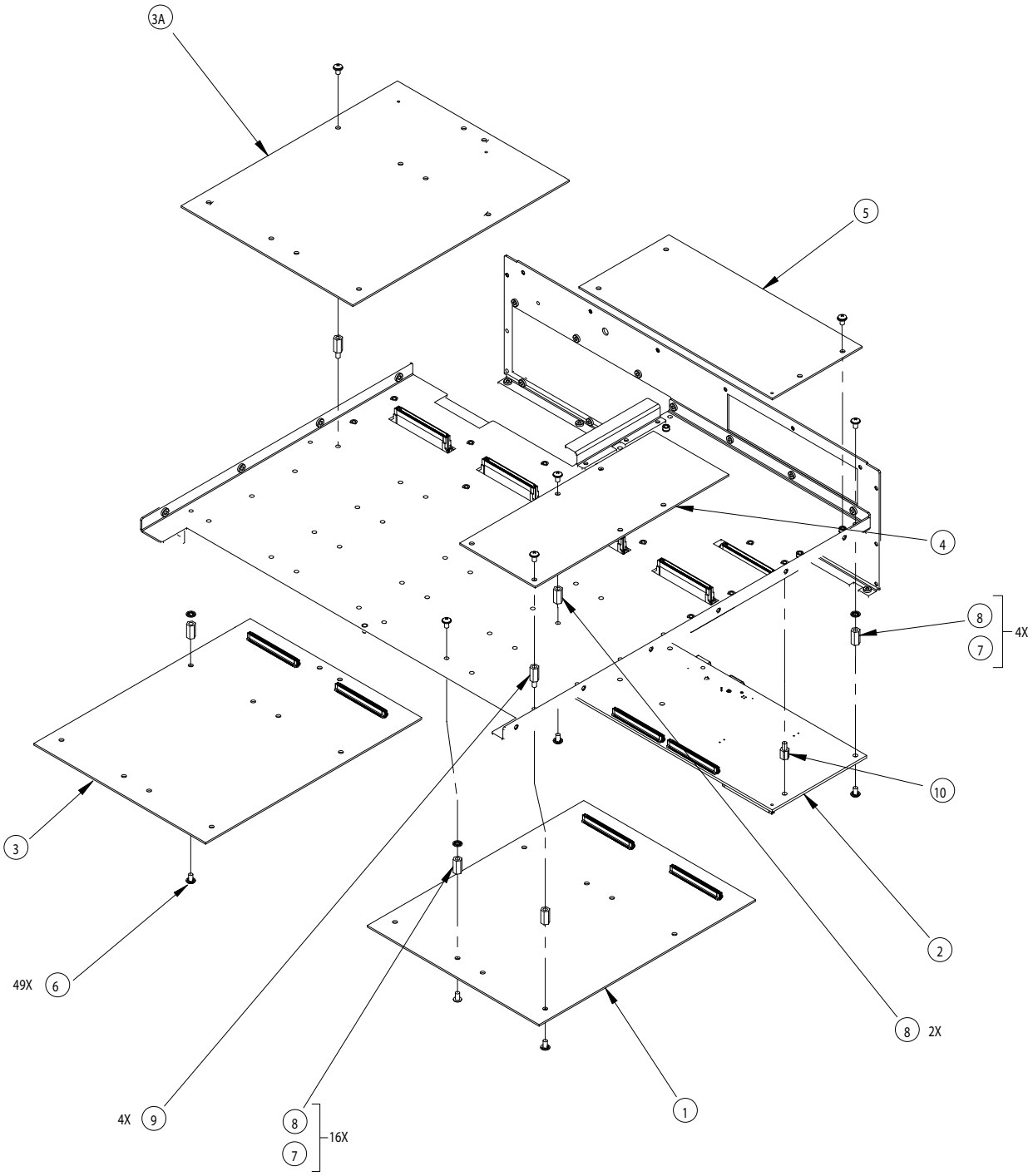


Figure 3-12 Circuit Boards (bottom view) (8-chan)

Table 3-13: Front Switch Panel

ITEM	PART NO	DESCRIPTION	QTY
	BLOG.0000	FRONT SWITCH PANEL (COMPLETE ASSY)	1
1	7320.0025	INSERT, FRONT PANEL	1
2	7320.0028	BUTTON, ON/OFF, FRONT PANEL	1
3	BVIV.0000	BOARD, LED INSERT	1
4	5111.3110.7	SCREW MC PAN PH M/S ZINC #2-56 X 5/16	4
5	5622.0116	DIFFUSER, 20MM X 24 MM, ROSCOLUX #116	1

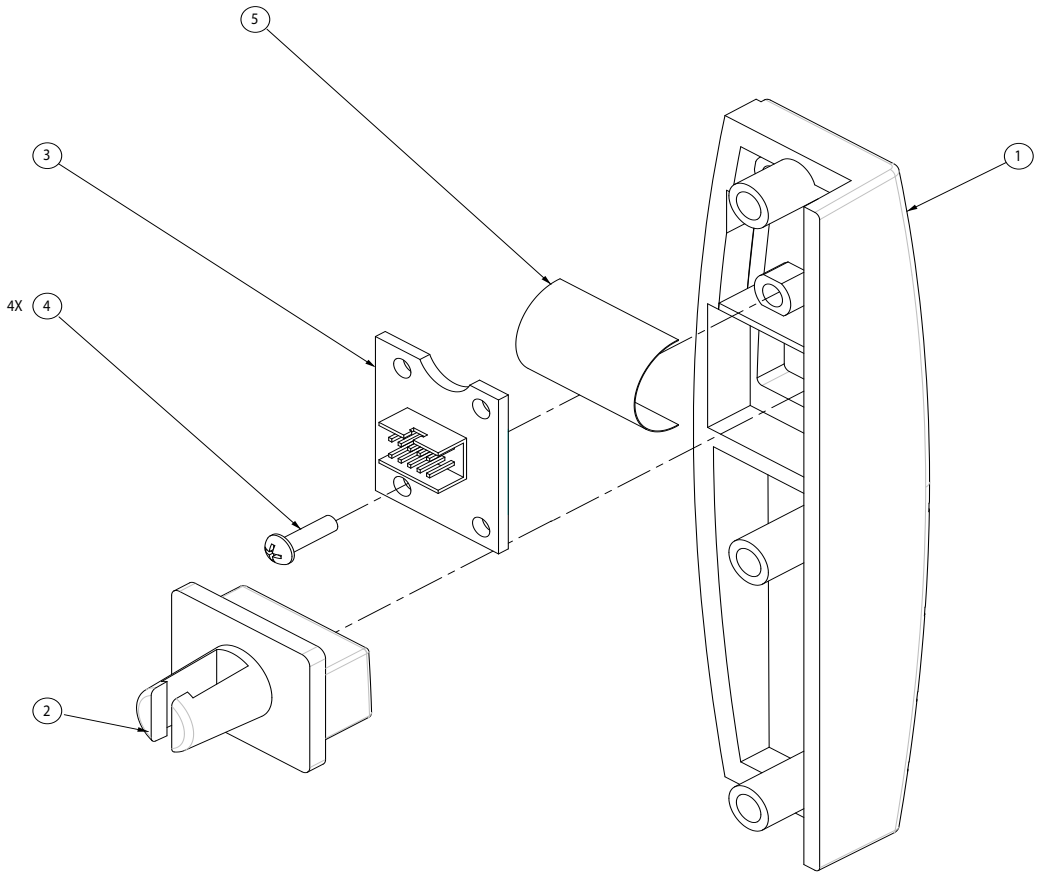


Figure 3-13 Front Switch Panel

Table 3-14: Analog Output Panel (2-chan)

ITEM	PART NO	DESCRIPTION	QTY
	BAOU.2000	ANALOG OUTPUT PANEL (2-CHAN) (COMPLETE ASSY)	1
1	7134.0145	PLATE, ANALOG, OUTPUT 203 (2-CHAN)	1
2	BOFP.0000	FRONT PANEL BOARD ASSY	1
3	4255.0003	JACK, BANANA	4
4	3612.0750	LIGHTPIPE PNL FLAT .750” CLEAR	4
5	4255.0002	JACK, BANANA GROUNDED KNURLED	2
6	4254.0014	JACK, BNC ISOLATED 50 OHM	2
7	5112.7108	SCREW MC SEM PH ZN #4-40X1/4	4
8	5522.1127	STANDOFF HEX THRD 3/16 X .858	4

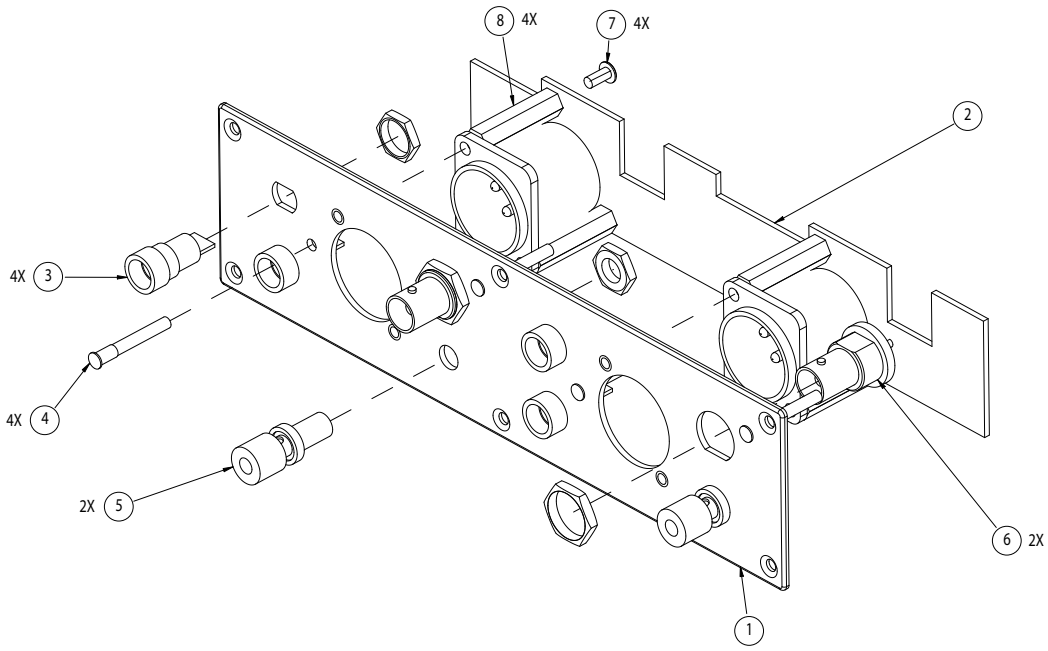


Figure 3-14 Analog Output Panel (2-chan)

Table 3-15: Analog Output Panel (8-chan)

ITEM	PART NO	DESCRIPTION	QTY
	BAOU.0000	ANALOG OUTPUT PANEL (8-CHAN) (COMPLETE ASSY)	1
1	BLED.0000	BOARD, LED D-SUB PANEL MT ASSY	1
2	7134.0143	PLATE, ANALOG OUTPUT 201 (8-CHAN)	1
3	4255.0002	JACK BANANA GNDED KNURLED	1
4	5532.1106.1	STANDOFF, HEX, M/F, JACK SCREW	2
5	4255.0002	NUT PANEL, BR-NKL 1/4-32 X 3/8 X 3/32	2
6	4254.0014	JACK ISOLATED BNC PNL MT 50 OHM FM	8
7	3612.0125	LIGHTPIPE STRT FLAT .125 LONG CLEAR	9

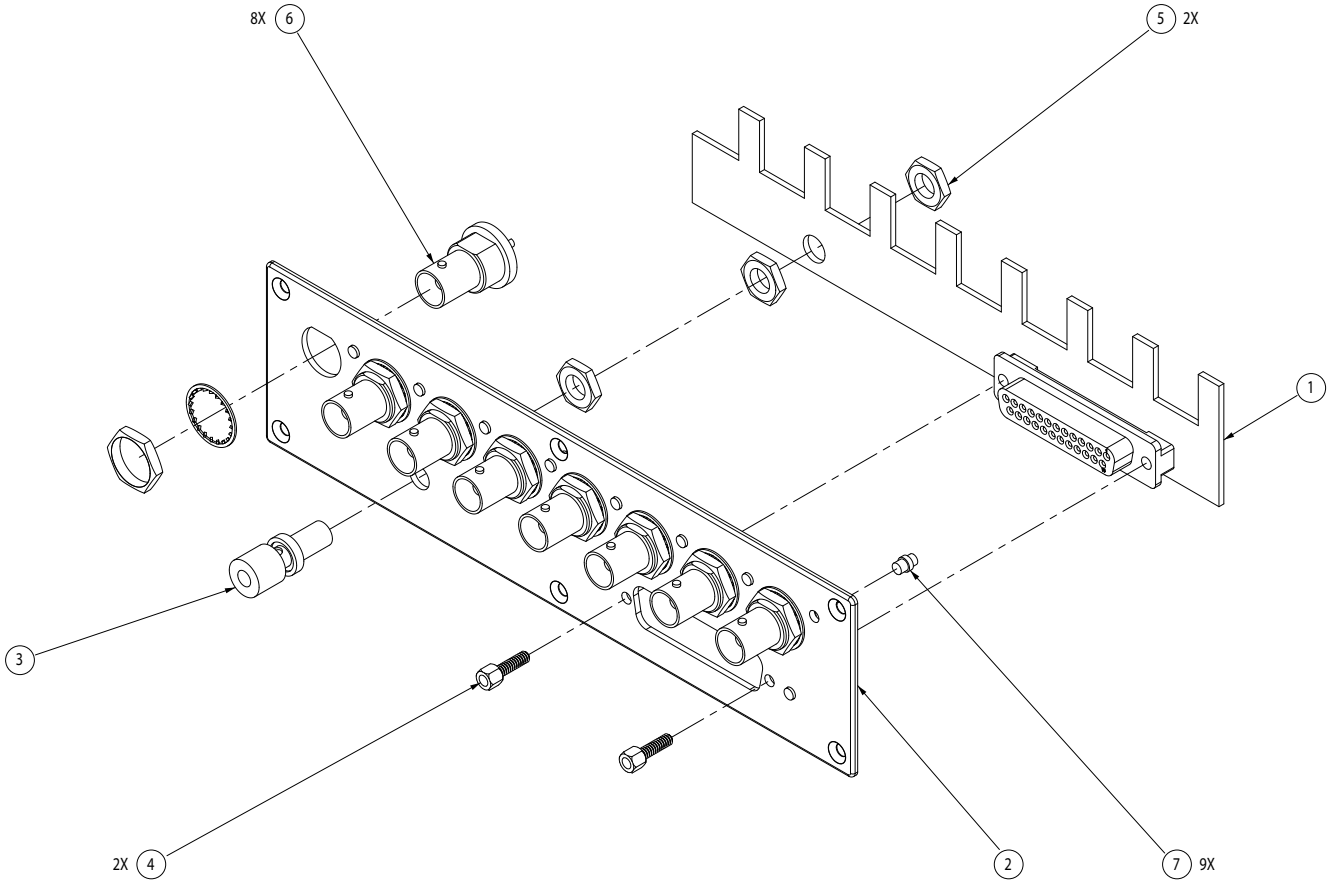


Figure 3-15 Analog Output Panel (8-chan)

Table 3-16: Analog Input Panel (2-chan)

ITEM	PART NO	DESCRIPTION	QTY CHAN 1&2	QTY CHAN 3&4
	BAIN.2000	ANALOG INPUT PANEL (2-CHAN) (COMPLETE ASSY)	1	
	BAIN.3000	ANALOG INPUT PANEL CHAN 3&4 (2-CHAN) (COMPLETE ASSY)		1
1	7134.0144	PLATE, ANALOG INPUT 204 (2-CHAN)	1	
1	7134.0149	PLATE, ANALOG INPUT 207 (2-CHAN)		1
2	BIFP.0000	FRONT PANEL BOARD ASSY	1	1
3	4255.0003	JACK, BANANA	4	4
4	3612.0750	LIGHTPIPE PNL FLAT .750” CLEAR	4	4
5	4255.0002	JACK, BANANA GROUNDED KNURLED	2	2
6	4254.0014	JACK, BNC ISOLATED 50 OHM	2	2
7	5112.7108	SCREW MC SEM PH ZN #4-40X1/4	4	4
8	5522.1127	STANDOFF HEX THRD 3/16 X .858	4	4

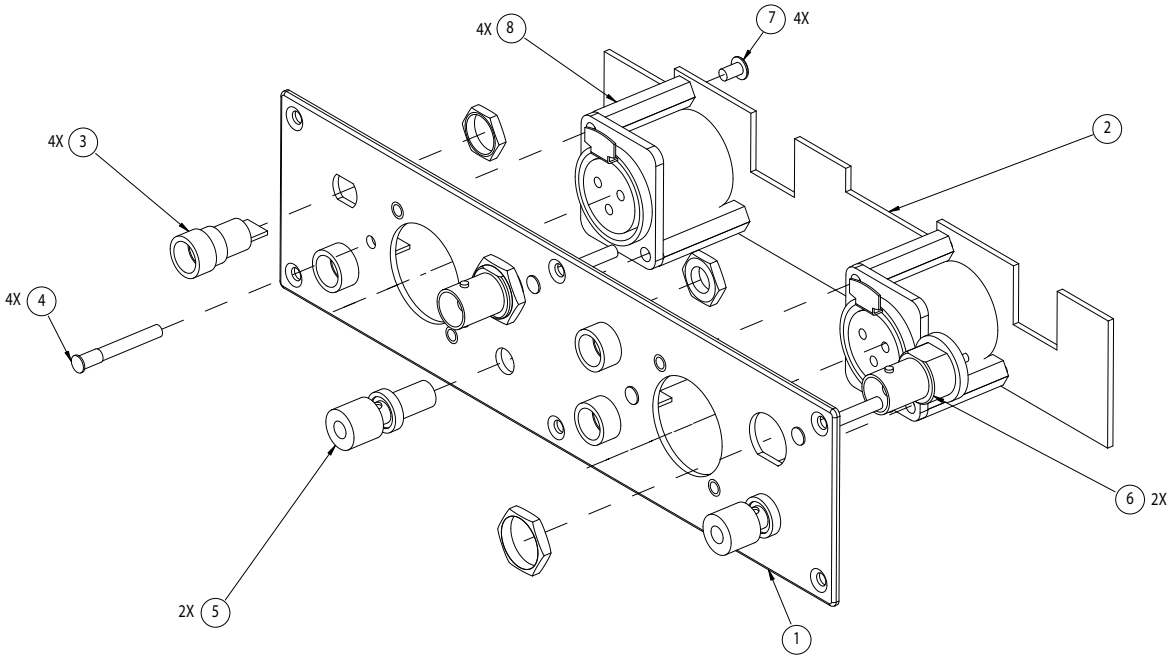


Figure 3-16 Analog Input Panel (2-chan)

Table 3-17: Analog Input Panel (8-chan)

ITEM	PART NO	DESCRIPTION	QTY CHAN 1-8	QTY CHAN 9-16
	BAIN.0000	ANALOG INPUT PANEL (8-CHAN) (COMPLETE ASSY)	1	
	BAIN.1600	ANALOG INPUT PANEL CHAN 9-16 (8-CHAN) (COMPLETE ASSY)		1
1	BLED.0000	BOARD, LED D-SUB PANEL MT ASSY	1	1
2	7134.0142	PLATE, ANALOG INPUT 205 (8-CHAN)	1	
2	7134.0140	PLATE, ANALOG INPUT 206 (8-CHAN)		1
3	4255.0002	JACK BANANA GNDED KNURLED	1	1
4	5532.1106.1	STANDOFF, HEX, M/F, JACK SCREW	2	2
5	4255.0002	NUT PANEL, BR-NKL 1/4-32 X 3/8 X 3/32	2	2
6	4254.0014	JACK ISOLATED BNC PNL MT 50 OHM FM	8	8
7	3612.0125	LIGHTPIPE STRT FLAT .125 LONG CLEAR	9	9

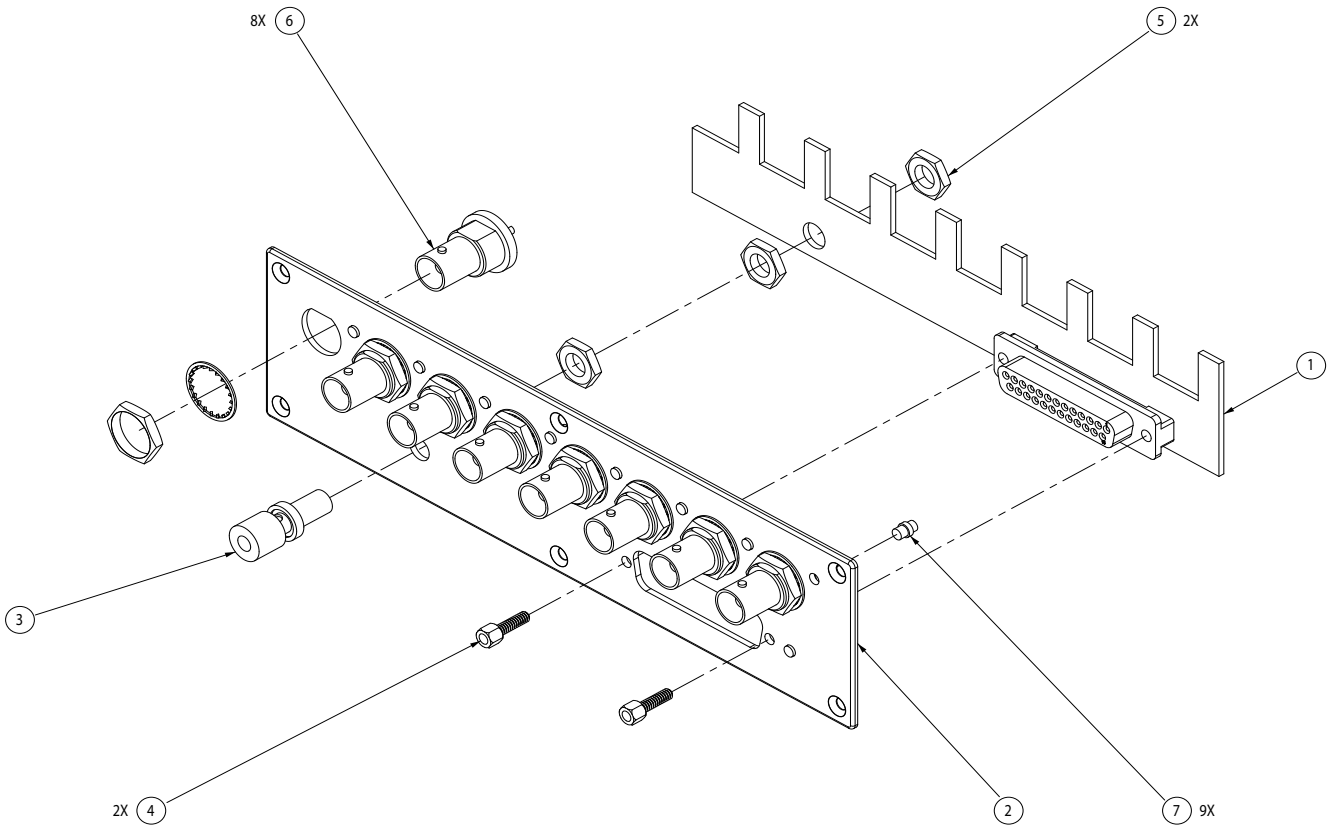


Figure 3-17 Analog Input Panel (8-chan)

Table 3-18: Advanced Digital I/O Panel

ITEM	PART NO	DESCRIPTION	QTY
	BDFP.0000	ADV DIGITAL I/O PANEL (COMPLETE ASSY)	1
1	BDIF.0000	BOARD, DIGITAL I/O CONNECTORS	1
2	7134.0172	PLATE, ADIO 219	1
3	4254.0001	JACK BNC PNL MT W/HDWR GNDED	2
4	5112.1108.7	SCREW FLT PH SS BLK ZN 4-40 X 1/4	2
5	5222.0001	NUT KEP 4-40	4
6	3612.2820	LIGHTPIPE RT ANG	2

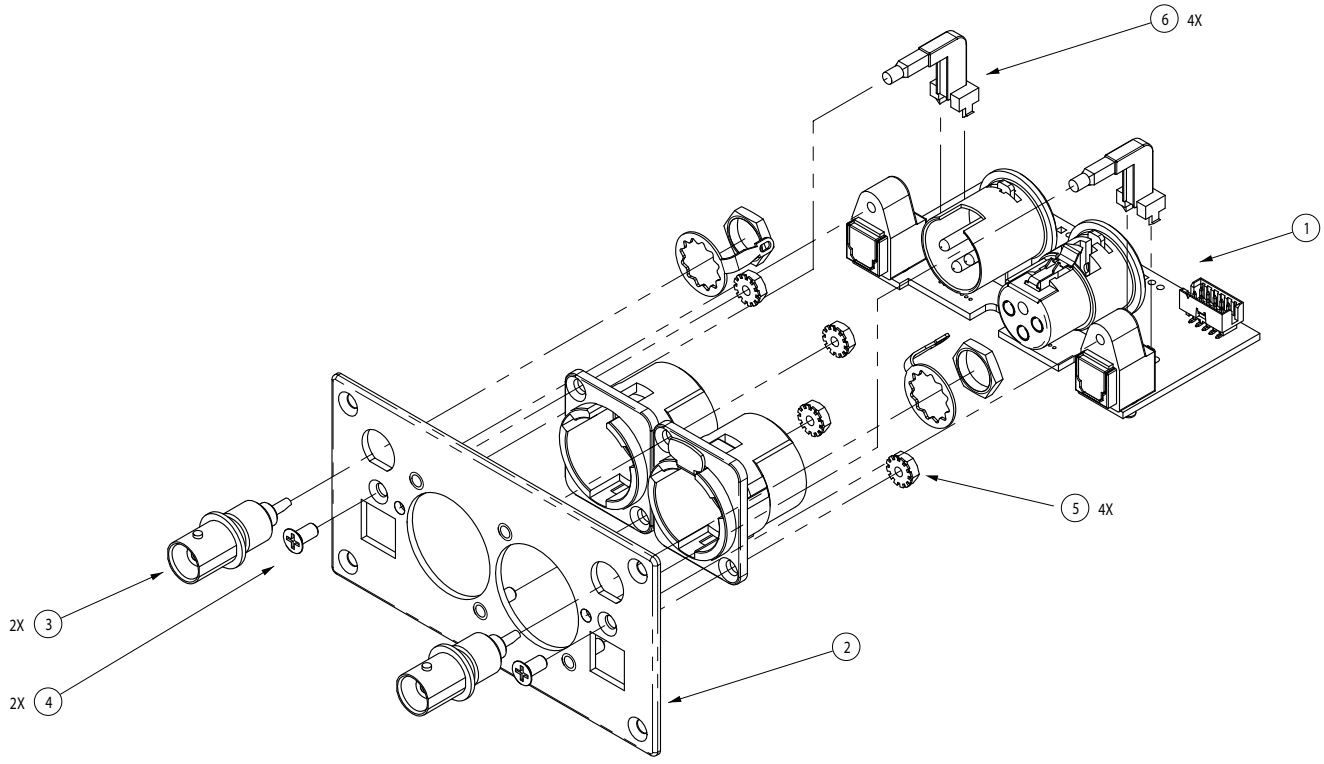


Figure 3-18 Advanced Digital I/O Panel

Table 3-19: Digital I/O Panel (Single wide)

ITEM	PART NO	DESCRIPTION	QTY
	BSPS.0000	DIGITAL I/O PANEL (COMPLETE ASSY)	1
1	BSFP.0000	BOARD, DIGITAL I/O CONNECTORS	1
2	7134.0178	PLATE, DIO 227	1
3	4254.0001	JACK BNC PNL MT W/HDWR GNDED	2
4	5112.1108.7	SCREW FLT PH SS BLK ZN 4-40 X 1/4	2
5	5222.0001	NUT KEP 4-40	4
6	3612.2820	LIGHTPIPE RT ANG	2

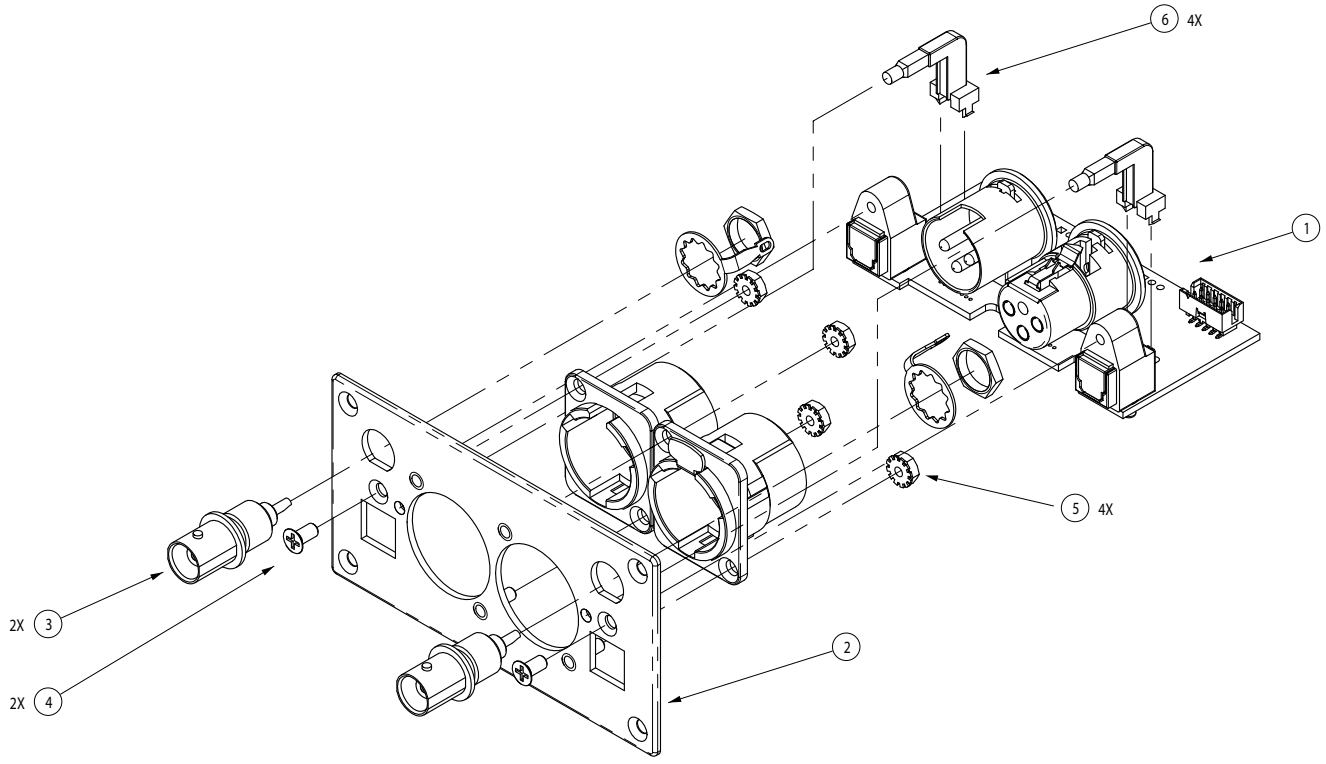


Figure 3-19 Digital I/O Panel (Single wide)

Table 3-20: Digital I/O Panel

ITEM	PART NO	DESCRIPTION	QTY
	BSOP.0000	DIGITAL I/O PANEL (COMPLETE ASSY)	1
1	BAFP.0000	BOARD, DIGITAL I/O CONNECTORS	1
2	7134.0147	PLATE, AESOP 110	1
3	4254.0001	JACK BNC PNL MT W/HDWR GNDED	2
4	5112.1108.8	SCREW FLT PH 100DEG ZN 4-40 X 1/4	2
5	5222.0001	NUT KEP 4-40	4
6	3612.0055	LIGHTPIPE 5.5” FLEX W/4MM LENS CAP	2

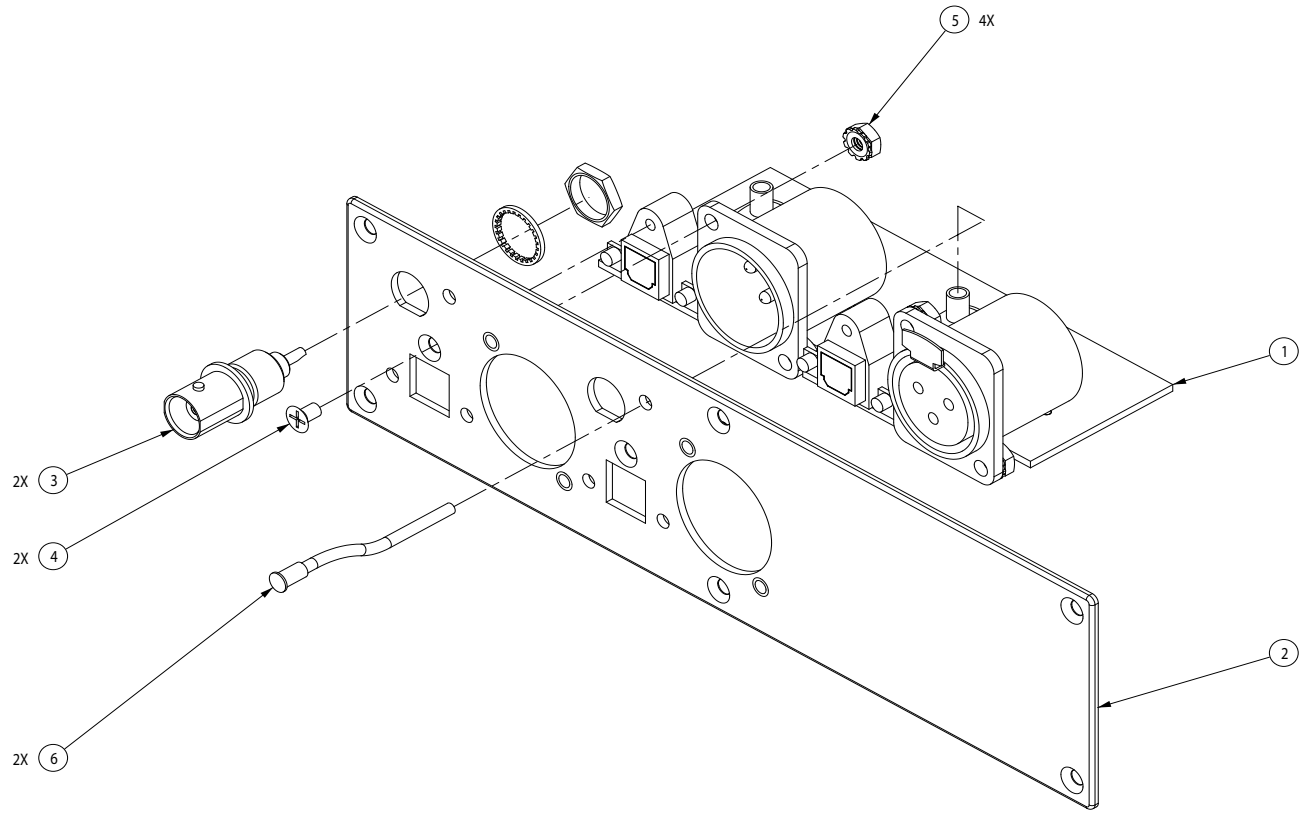


Figure 3-20 Digital I/O Panel

Table 3-21: Digital I/O Panel (unbalanced only, early units)

ITEM	PART NO	DESCRIPTION	QTY
	BDIG.0000	DIGITAL I/O PANEL (COMPLETE ASSY) (OBS NLA)	1
1	BCIF.0000	BOARD, DIGITAL I/O	1
2	7134.0139	PANEL, INTERFACE, DIGITAL MOD 109	1
3	7310.0039	BRACKET, SUPPORT	2
4	5112.1108.8	SCREW FLT PH 100DEG ZN 4-40 X 1/4	2
5	5113.7108	SCREW MC SEM PH ZN #6-32 X 1/4	2

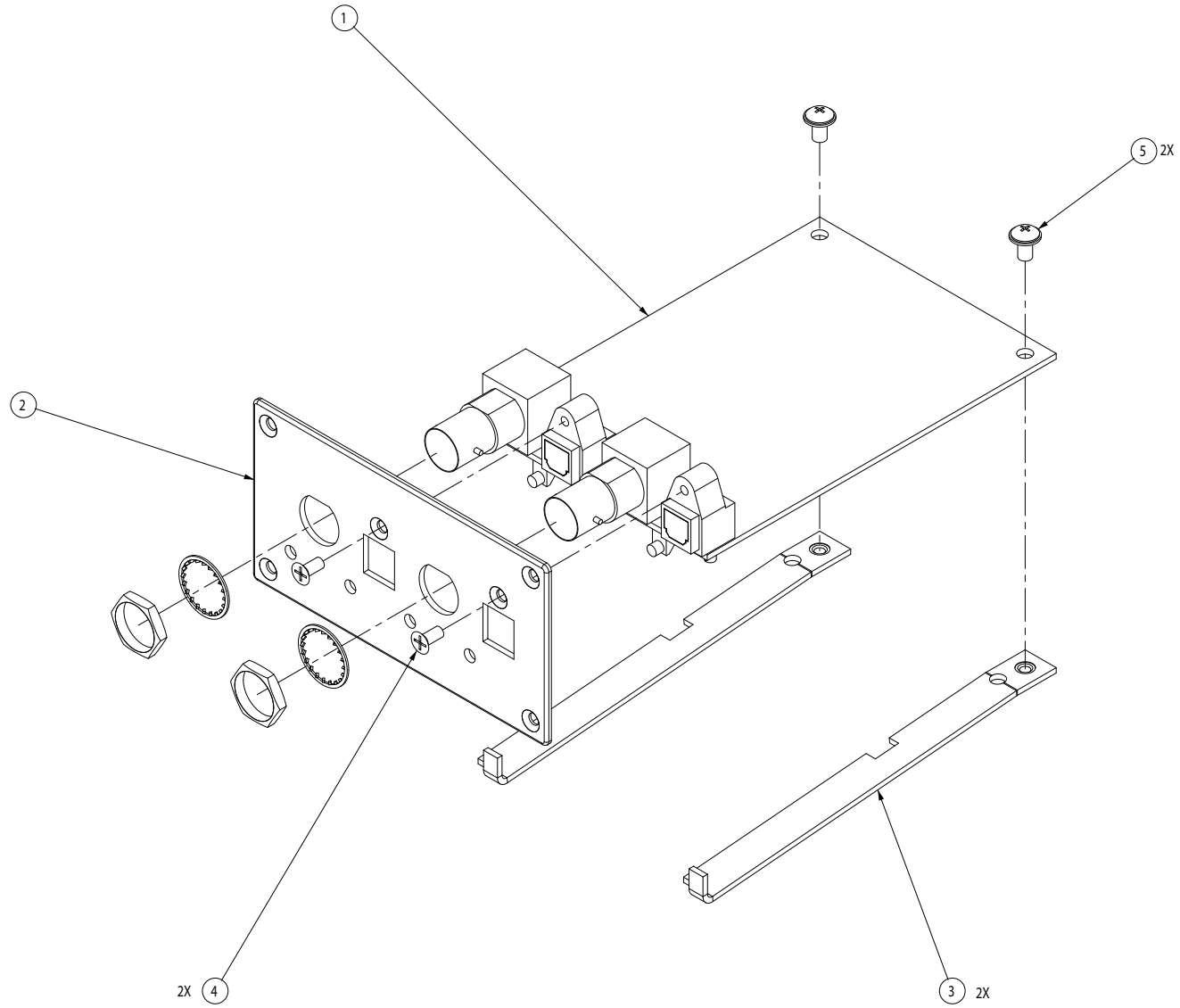


Figure 3-21 Digital I/O Panel (unbalanced only, early units)

Table 3-22: Digital I/O w/Digital Serial I/O Panel

ITEM	PART NO	DESCRIPTION	QTY
	BSIR.0000	DIGITAL I/O WITH DIGITAL SERIAL I/O PANEL (COMPLETE ASSY)	1
1	BAFP.0000	BOARD, DIGITAL I/O CONNECTORS	1
2	7124.0146	PLATE, DIGITAL I/O WITH DIGITAL SERIAL I/O 111	1
3	4254.0001	JACK BNC PNL MT W/HDWR GNDED	2
4	5112.1108.8	SCREW FLT PH 100DEG ZN 4-40 X 1/4	2
5	5222.0001	NUT KEP 4-40	4
6	3612.0055	LIGHTPIPE 5.5” FLEX W/4MM LENS CAP	2
7	5532.1106.1	STANDOFF, HEX, M/F, JACK SCREW	8
8	BDSA.0000	BOARD, DIGITAL SERIAL I/O	1
9	BMPA.0000	BOARD, DIGITAL SERIAL I/O MONITOR	1

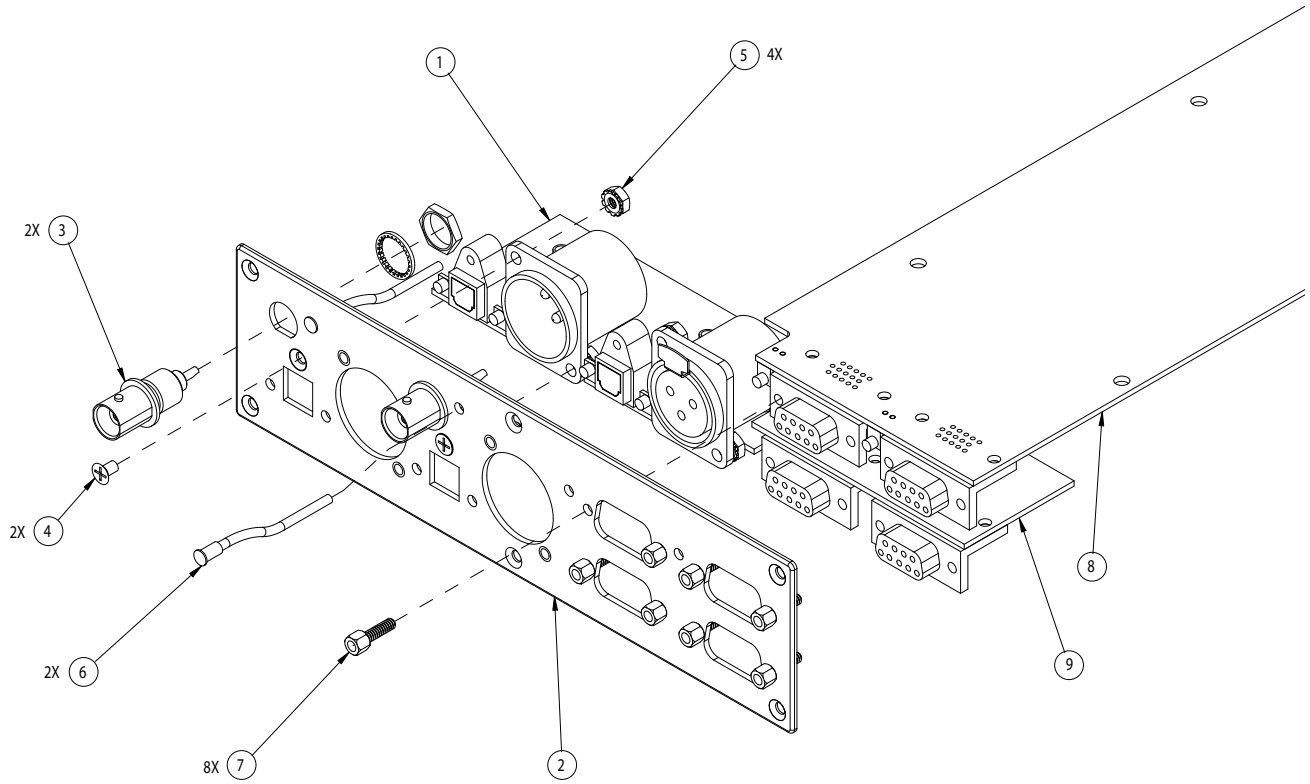


Figure 3-22 Digital I/O with Digital Serial I/O Panel

Table 3-23: Digital I/O w/Bluetooth Panel

ITEM	PART NO	DESCRIPTION	QTY
	BDIO.BT	DIGITAL I/O W/BLUETOOTH PANEL (COMPLETE ASSY)	1
1	3600.0000	ADAPTER FLEX LIGHT PIPE	2
2	3612.0055	LIGHTPIPE 5.5” FLEX	2
3	3612.0125	LIGHTPIPE STRT .125 CLR	2
4	4151.7002	CABLE ASSY 7” 2 COND	2
5	4251.0003	ADAPTER N TO SMA	1
6		NUT INCLUDED WITH #5	2
7		LOCKWASHER INCLUDED WITH #5	2
8	4253.0011	XLR M (SHELL ONLY; CONNECTOR ON BAFP.0000)	1
9	4253.0012	XLR F (SHELL ONLY; CONNECTOR ON BAFP.0000)	1
10	4254.0001	JACK BNC PNL MT	2
11		NUT INCLUDED WITH #10	2
12	5112.1108.7	SCREW FH BLK 4-40X1/4	2
13	5112.7108	SCREW MC PH ZN 4-40X4/4	2
14	5222.0001	NUT KEP #4-40	4
15	5417.0001	LUG SOLDER 3/8 IN	2
16	7134.0168	DIO W/BT PANEL	1
17	BAFP.0000	BAL/UNBAL DIG I/O PANEL PCB ASSY	1
18	BZFP.0000	AZUL FP PCB ASSY	1

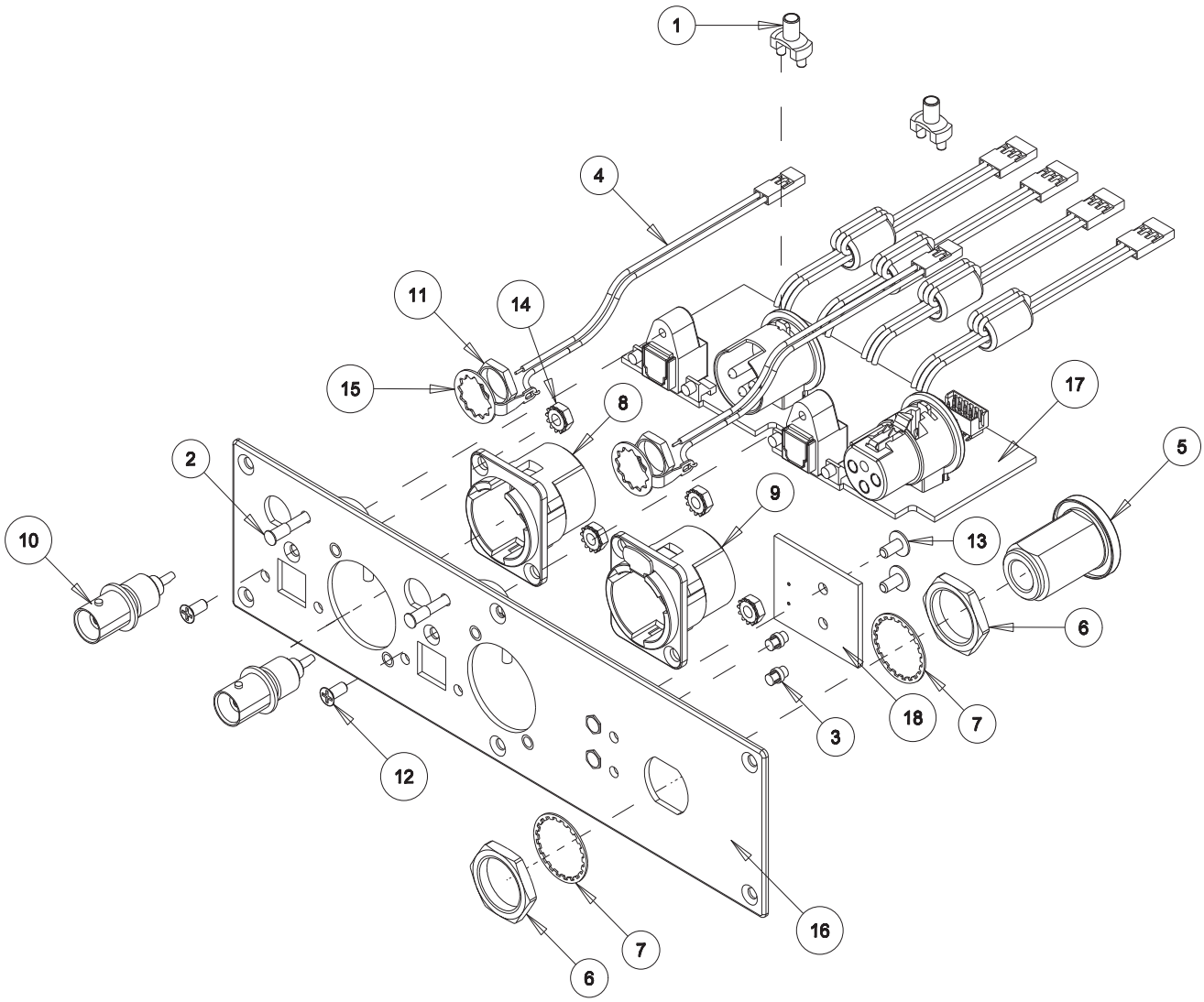


Figure 3-23 Digital I/O with Bluetooth

Table 3-24: Digital I/O w/PDM Panel

ITEM	PART NO	DESCRIPTION	QTY
	BDIO.PDM	DIGITAL I/O W/PDM PANEL (COMPLETE ASSY)	1
1	3600.0000	ADAPTER FLEX LIGHT PIPE	2
2	3612.0000	LIGHTPIPE .5 LG CLR	5
3	3612.0055	LIGHTPIPE 5.5” FLEX	2
4	4151.7002	CABLE ASSY 7” 2 COND	2
5	4253.0011	XLR M (SHELL ONLY; CONNECTOR ON BAFP.0000)	1
6	4253.0012	XLR F (SHELL ONLY; CONNECTOR ON BAFP.0000)	1
7	4254.0001	JACK BNC PNL MT	2
8		NUT INCLUDED WITH #7	2
9	5112.1108.7	SCREW FH BLK 4-40X1/4	2
10	5222.0001	NUT KEP #4-40	4
11	5241.0001	NUT JAM	10
12	5325.0002	WASHER LOCK	5
13	5417.0001	LUG SOLDER 3/8 IN	2
14	7134.0169	DIO-PDM PANEL	1
15	BAFP.0000	DIO PANEL PCB ASSY	1
16	BPFP.0000	PDM PANEL PCB ASSY	1

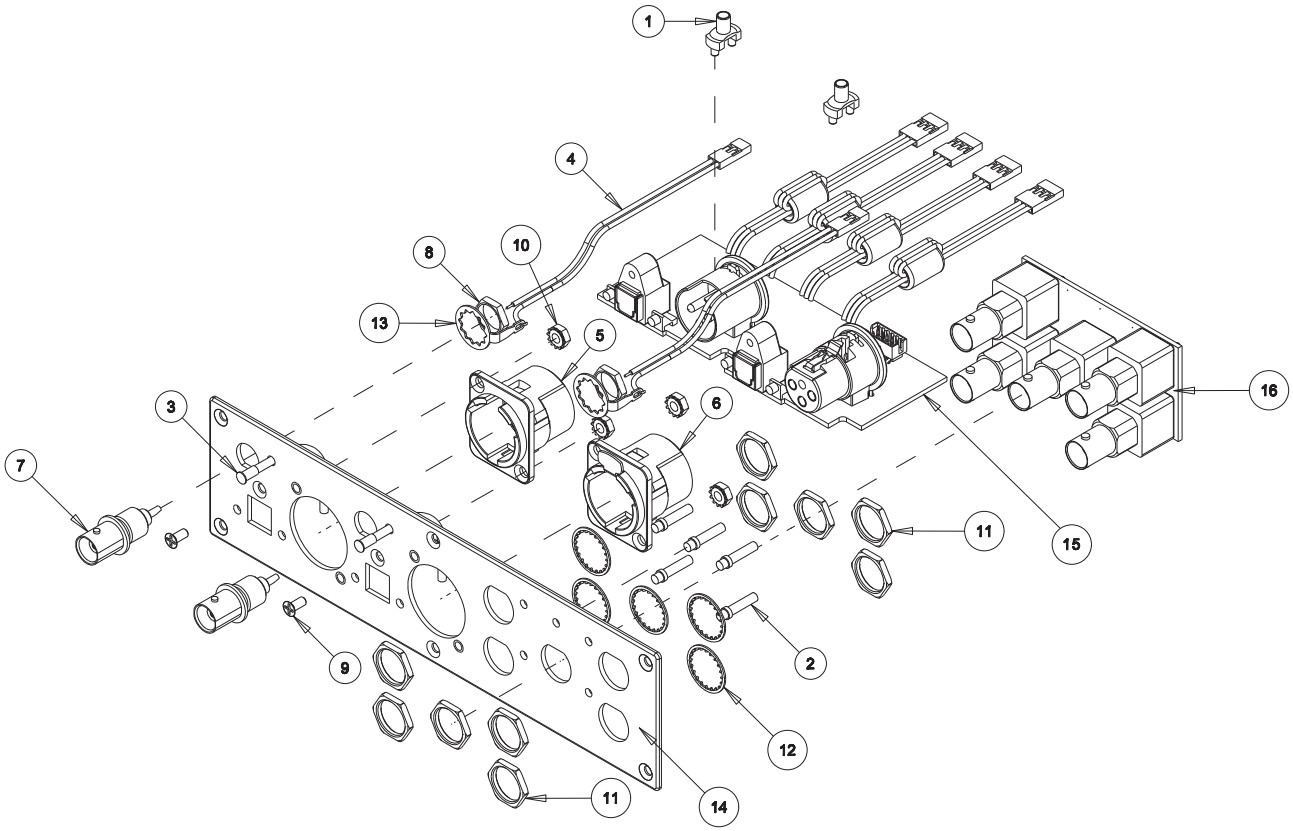


Figure 3-24 Digital I/O with PDM Panel

Table 3-25: HDMI Panel (Type M)

ITEM	PART NO	DESCRIPTION	QTY
	BHDM.0000	HDMI FRONT PANEL (COMPLETE ASSY)	1
1	BVID.0000	HDMI BOARD ASSEMBLY	1
2	7134.0160	PANEL, HDMI I/F 112	1
3	5112.1108.8	SCREW FLT PH 100DEG ZN4-40 X 1/4	4
4	5222.0001	NUT KEP 4-40	4

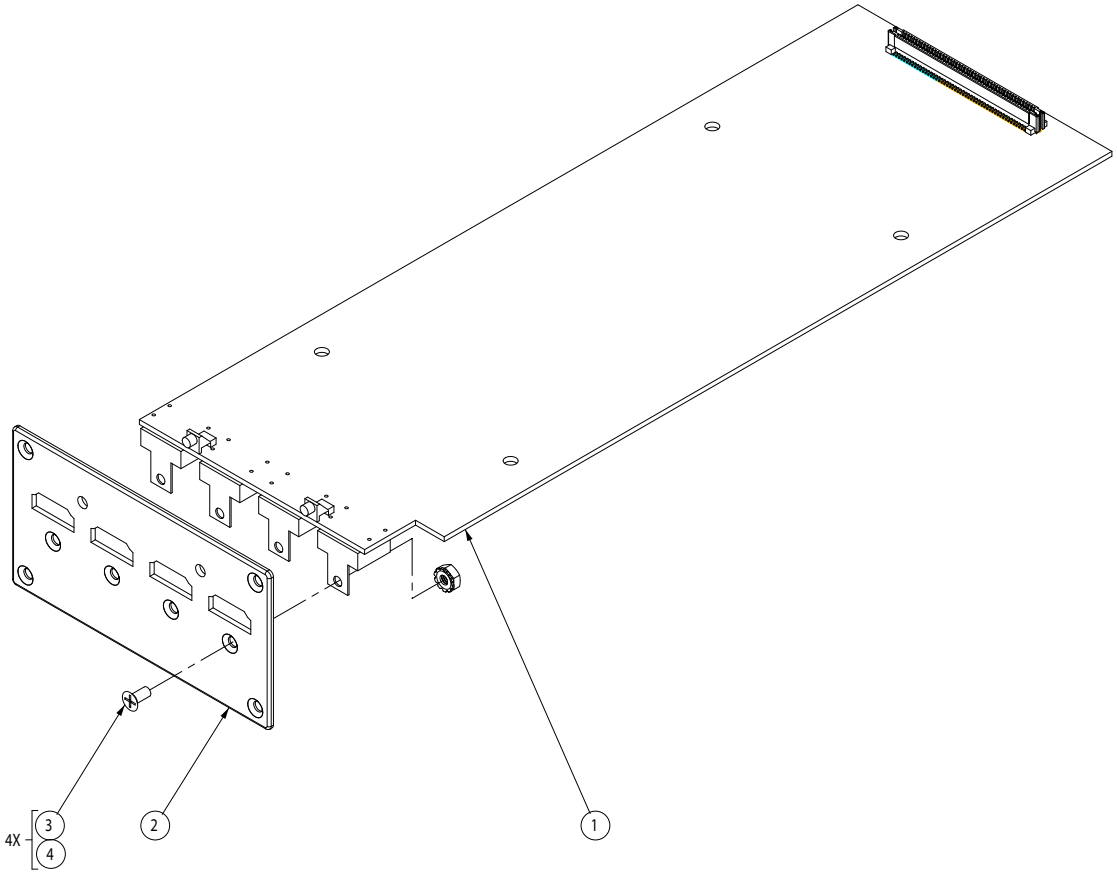


Figure 3-25 HDMI Panel (Type M)

Table 3-26: HDMI Panel (Type E)

ITEM	PART NO	DESCRIPTION	QTY
	BHDM.0000	HDMI FRONT PANEL (COMPLETE ASSY)	1
1	3612.1000	LIGHTPIPE RT ANG FLAT FACE CLEAR	4
2	5112.1110.8	SCREW PHSTL 100DEG BLK FHS4-40X5/16	4
3	7134.0179	ERNI CONN PNL VID/HDMI I/F MOD 226	1
4	BVID.0000	ERNI HDMI ARC BOARD ASSEMBLY	1

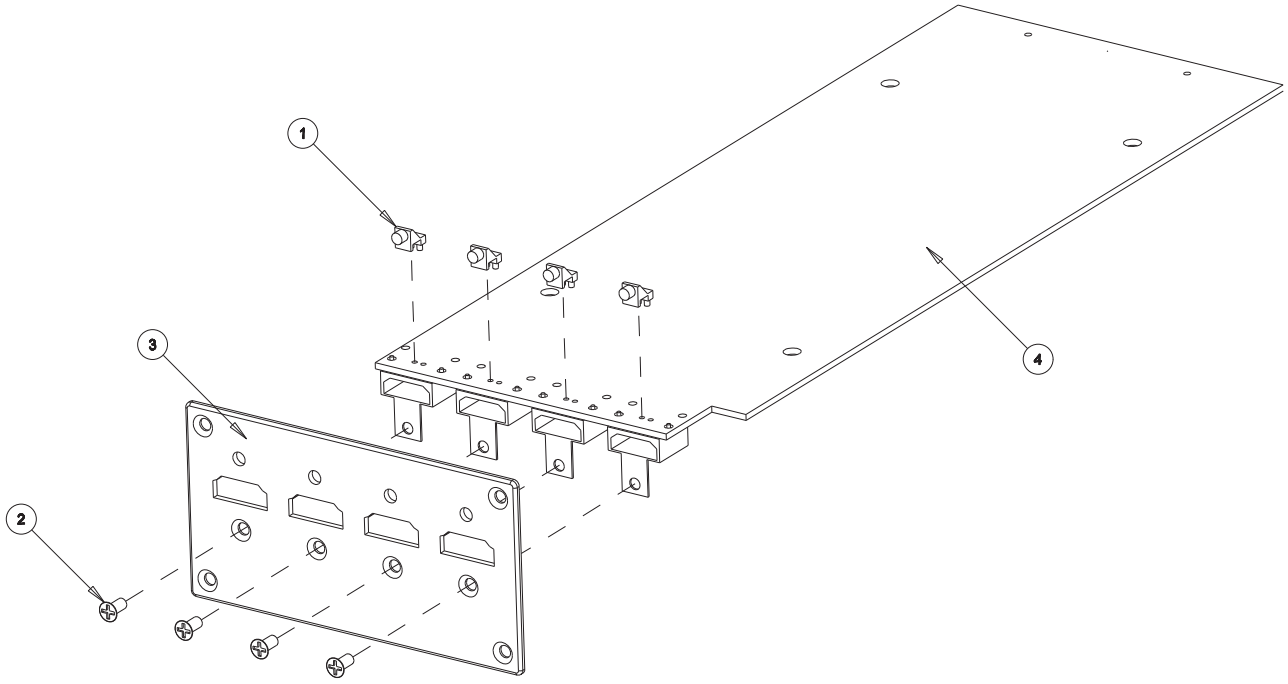


Figure 3-26 HDMI Panel (Type E)

Table 3-27: Bluetooth Panel

ITEM	PART NO	DESCRIPTION	QTY
	BTFP.0000	BLUETOOTH FRONT PANEL (COMPLETE ASSY)	1
1	3612.0125	LIGHTPIPE STRT .125 CLR	2
2		LOCKWASHER INCLUDED WITH #3	2
3	4255.0004	JACK TYPE N BULKHEAD TO U.FL/AMC	1
4		NUT INCLUDED WITH #3	2
5	5113.7108	SCREW MC SEM PH ZN #6-32X1/4	2
6	7134.0161	CONN PNL BLUE TOOTH I/F MODEL 213	1
7	BZFP.0000	AZUL FP ECB ASSY	1

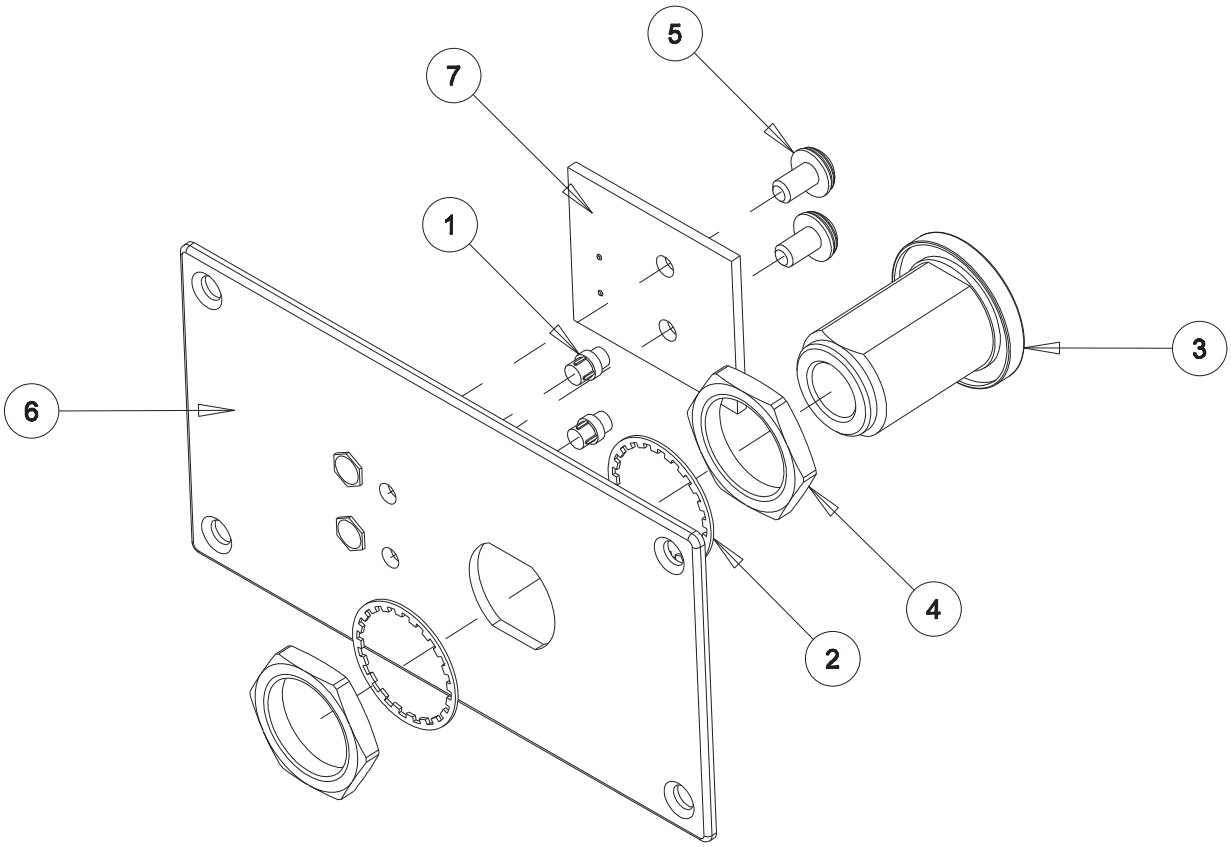


Figure 3-27 Bluetooth Panel

Table 3-28: PDM Panel

ITEM	PART NO	DESCRIPTION	QTY
	BPDF.0000	PDM FRONT PANEL (COMPLETE ASSY)	1
1	3612.0000	LIGHTPIPE .5 LG CLEAR	5
2	5241.0001	NUT JAM	10
3	5325.0002	WASHER LOCK	5
4	7134.0166	CONN PANEL PDM 228	1
5	BPFP.0000	APX PDM FR PANEL ASSY	1

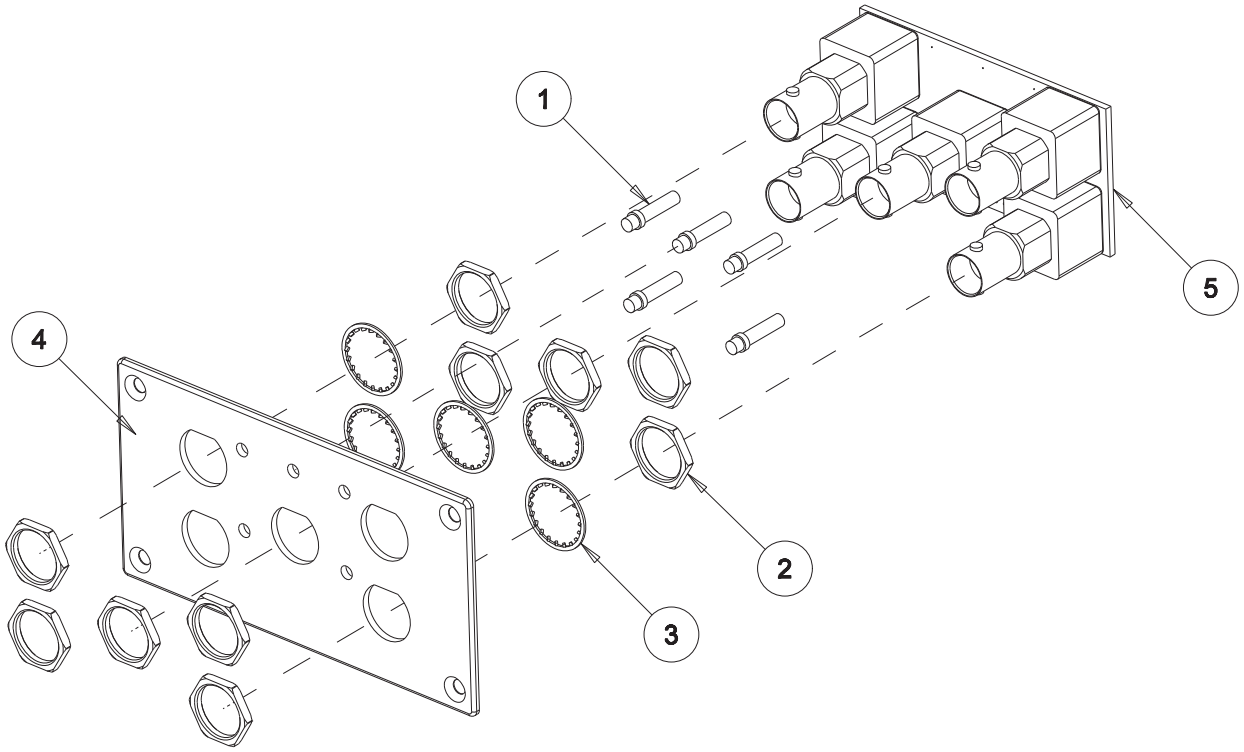


Figure 3-28 PDM Panel

Table 3-29: Digital Serial I/O Panel

ITEM	PART NO	DESCRIPTION	QTY
	BDIO.0000	DSIO FRONT PANEL (COMPLETE ASSY)	1
1	5532.1106	HEX M/F JACK SCREW	8
2	7134.0167	CONN PANEL DSIO SINGLE MODEL 216	1
3	BDSA.0000	DIGIT SERIAL PCB ASSY	1
4	BMPA.0000	MONITOR PANEL PCB ASSY	1

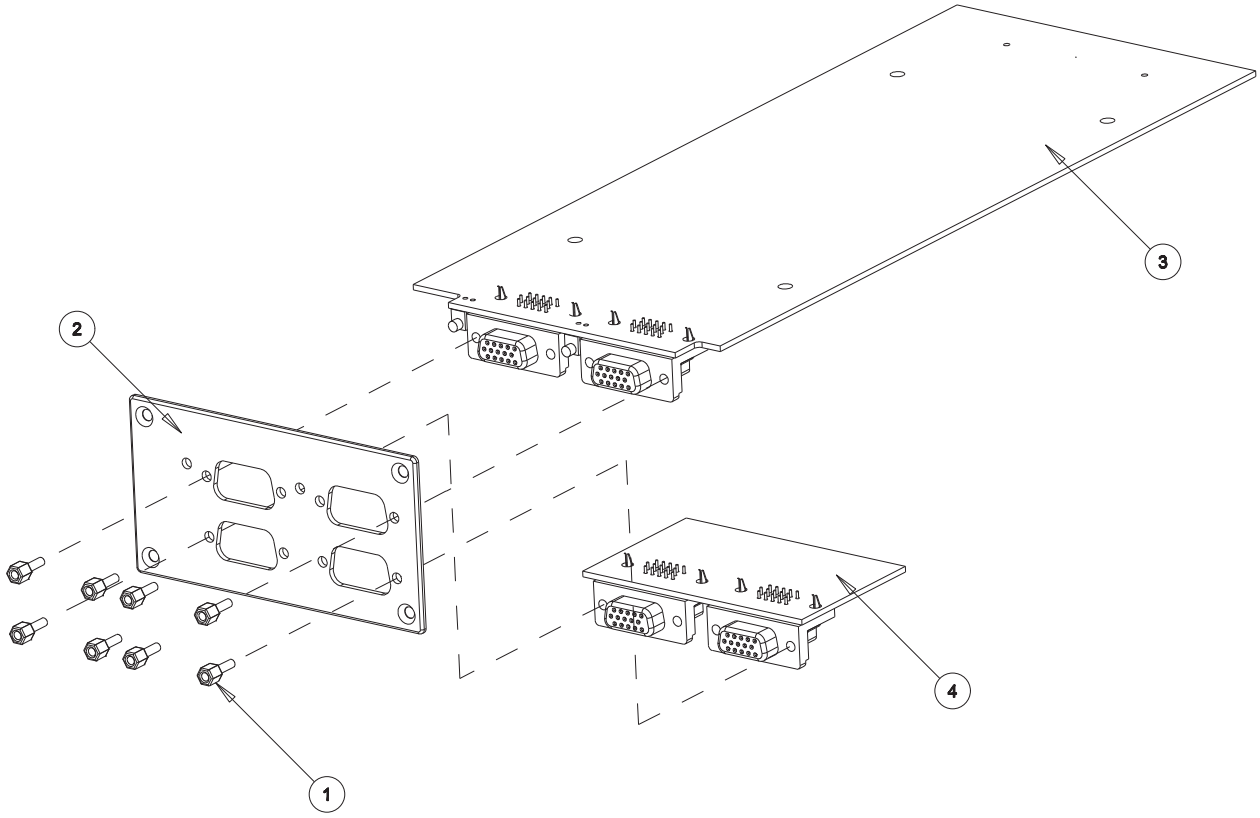


Figure 3-29 Digital Serial I/O Panel

Section 4: Adjustments

4.1 Introduction

Adjustment is the process of changing or resetting various hardware and/or software elements to compensate for the inevitable effects of component tolerances and drift.

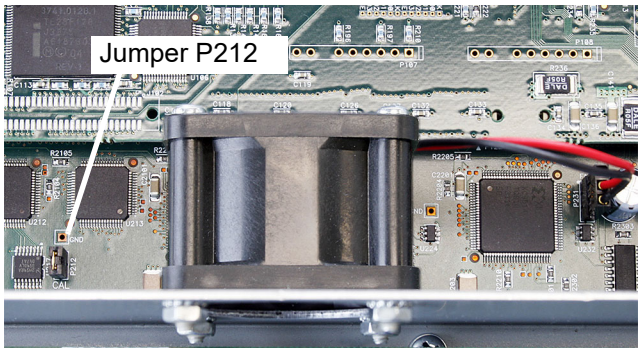
Audio Precision recommends following a periodic adjustment schedule to insure optimum instrument performance. Once every 24 months is generally sufficient if the unit is operated under controlled environmental conditions between +15° C and +30° C (+59° F and +86° F). This interval should be reduced to once every 12 months if the unit is operated under environmental extremes and/or exposed to mechanical vibration or condensing humidity.

Adjustment should always be performed following any major repair or module replacement.

The APx Self Test should be run, both before and after an adjustment, to check all major aspects of the instrument's performance against published specifications. Instructions for running the Self Test are in Section 5.

4.2 Physical Preparation

Unplug the AC power cord and remove both the top and bottom instrument covers. Remove jumper P212, located on the BRIO module just to the left of the left-side fan, and set it aside.



Position the unit as needed to gain access to the module being adjusted. Reconnect the ac power cord and turn the power switch on. Be sure the power line voltage is between 100 and 240 Vac.

If adjustment is taking place following a repair or module replacement, be sure that all mounting hardware and interconnection cables have been replaced, and that all cables are positioned exactly as they were previously. Many of the modules depend upon grounding paths through the mounting screws for proper operation.

4.3 Adjustment Location Diagrams

Diagrams of adjustment and test point locations start on page 4-5. The points are also shown in each screen prompt of the corresponding APx adjustment project. The locations of the modules in the instrument are shown in Section 3. Page 7-1 provides help in identifying module revisions.

4.4 Test Points

Test points are either small square copper circuit board pads, or red stand-up eye loops. Unless otherwise noted, any convenient chassis point may be used as ground reference for all voltage and signal measurements.

4.5 Environmental Range

Adjustments should be performed only between +20° C and +25° C (+68° F and +77° F). After powering on the instrument, allow at least 60 minutes for circuit stabilization before proceeding with any adjustments.

4.6 Required Test Equipment and Cables

The following equipment is required to adjust the APx instrument. Minimum performance

characteristics and suggested models are listed below:

Multimeter:	Fluke 8845A or Agilent 34401A
Counter:	7 digits, ±0.2 ppm Agilent 53131A with opt 010 timebase
Oscilloscope:	Tektronix TDS3052B

A number of cables are needed to perform the adjustments. You may supply your own cables, or obtain most of them from Audio Precision by ordering the SVC-KIT005 service kit, as well as the appropriate instrument-specific kit below. The complete list of cables and cable kits available from AP is online at www.ap.com/products/accessories/cables. You will also need the items listed under "Additional Cables/Adapters".

CAB-520 / CAB-521:
(for APx520, 525, or 555 without Digital IO / APx521 or 526 without Digital IO)

AP P/N	QTY	Description
4155.010x[1]	4[2]	XLR-M to XLR-F Cable 8'
4155.0039	4	BNC to BNC Cable 1M
4155.0525	1[5,6]	Ground Strap

CAB-525 / CAB-526: (for APx525 or APx555 / APx526)

AP P/N	QTY	Description
4155.010x[1]	4[2]	XLR-M to XLR-F Cable 8'
4155.0039	4	BNC to BNC Cable 1M
4155.0117	2[5]	XLR AES/EBU Cable 1M
4151.0303	1[5]	TOSLINK Optical Cable
4155.0525	1[5,6]	Ground Strap

CAB-582: (for APx582)

AP P/N	QTY	Description
4150.0003	1	DB25 to XLR-F Cable
4155.0301	3	BNC to BNC Cable 14"
4155.0117	2[5]	XLR AES/EBU Cable 1M
4151.0303	1[5]	TOSLINK Optical Cable
4251.0101	10[5,6]	BNC to RCA Adapters
4155.0525	1[5,6]	Ground Strap

CAB-585 / CAB-586 (for APx585 / APx586):

AP P/N	QTY	Description
4150.0001	1[5]	DB25 to DB25 Cable
4150.0002	1	DB25 to XLR-M Cable
4150.0003	1[3]	DB25 to XLR-F Cable
4155.0301	11	BNC to BNC Cable 14"
4155.0117	2[5]	XLR AES/EBU Cable 1M
4151.0303	1[5]	TOSLINK Optical Cable
4251.0101	18[4,5,6]	BNC to RCA Adapters
4155.0525	1[5,6]	Ground Strap

SVC-KIT005:

AP P/N	QTY	Description
4151.FADJA	1	XLR-F to Banana Cable
4151.CMAA	1	DB25 to BNC Common Mode Fixture

ADDITIONAL CABLES/ADAPTERS:

AP P/N	QTY	Description
4155.0039	1	BNC to BNC Cable 1M
n/a	1	BNC-M to Dual Banana Adapter[7] (Pomona 1269 or equivalent)

Notes:
1. x= 2-Red, 4-Yellow, 5-Green, 6-Blue, (7-Black, 8-White).
2. CAB-521/526 quantity=6.
3. CAB-586 quantity=2.
4. CAB-586 quantity=26.
5. Not used for adjustments.
6. Not used for Self Test.
7. Not available from Audio Precision.

Caution: Perform adjustments in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

4.7 Installing the Service Package Files

APx500 measurement software must already be installed before copying the files provided in this download. The adjustment projects require the specific version of APx500 measurement software indicated in the Readme.txt file of the download. The APx500 software may be downloaded from ap.com. If this version is different than the version you are currently running, it may be installed concurrently in a separate directory.

Copy the \Addins folder to \Program Files (x86)\Audio Precision\APx500 x.x\Addins. Copy the \Service folder to a convenient location, such as \My Documents\Audio Precision\APx500 x.x\Service. In both cases, x.x represents the version of APx500 that is required.

4.8 Running the Adjustment Project

Run **APx-Adjust.exe**, located in the \Service\Adjustments folder. This will load the correct APx adjustment project (except for the APx555 model; see below for more detail). This will enable the correct signal paths for the connected instrument. To start the adjustment sequence, click the green arrow or choose **Project > Run Sequence**. Follow the on-screen prompts. Modules that are not included in the adjustment project do not require adjustment.

For the APx555 models the **APx-Adjust.exe** is not used. During the adjustment process for both the output and input adjustments the B4SG and B4BR modules will need to be removed to gain access to the adjustment locations on the B4AO and B4AI modules. Each adjustment project for the APx555 is run as a separate project.

To adjust the B4AO module turn off the power to the instrument and remove the B4SG module and set it aside. Turn the instrument on and open the control software. Click on the **File** button on the control bar and then click on the **Open Project** button and load the **555-Adjust-AO** project. Click the green arrow or choose **Project > Run Sequence**. After the B4AO module is adjusted the instrument is turned off and the B4SG module is reinstalled. After the power is restored and the control software is opened the **555-Adjust-SG** adjustment project is loaded and then run.

To adjust the B4AI module turn off the power to the instrument and remove the B4BR module and set it aside. Turn the instrument on and open the control software. Click on the **File** button on the control bar and then click on the **Open Project** button and load the **555-Adjust-AI** project. Click the green arrow or choose **Project > Run Sequence**. After the B4AI module is adjusted the instrument is turned off and the B4BR module is reinstalled. After the power is restored and the control software is opened the **555-Adjust-BR** adjustment project is loaded and then run.

4.9 Setting A/D Constants

After completing the adjustment project, set the A/D converter constants by going to Tools > Service > Analog Input Adjustment in the APx500 software. Connect the Analog Outputs to the Analog Inputs with short BNC cables when prompted.

4.10 Module Adjustment Date

After setting the A/D, go to Tools > Service > Module Adjustment. In the form, enter your initials, mark the check boxes for the modules that you have adjusted, check that the date is set correctly, and click Save. This information will be saved to the EEPROM on each module.

4.11 Jumper Replacement

After completing the adjustments, exit the APx500 software and turn off the instrument. Replace jumper J212 and reattach the covers.

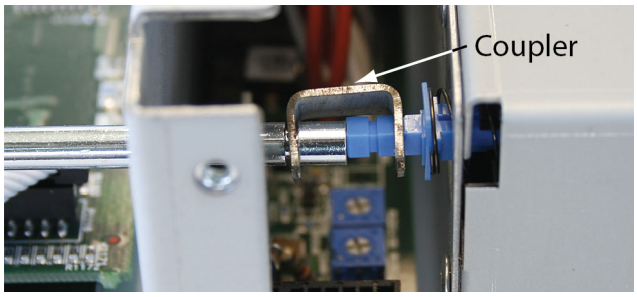
4.12 5 Volt Power Supply Adjustment

If it is determined from the power supply checks in the adjustment procedure that the +5 Vdc supply needs adjustment, follow the steps below to access the trimmer and set it to +5.0 ± 0.1 Vdc. Once it is trimmed, restart the adjustment project sequence from the beginning.

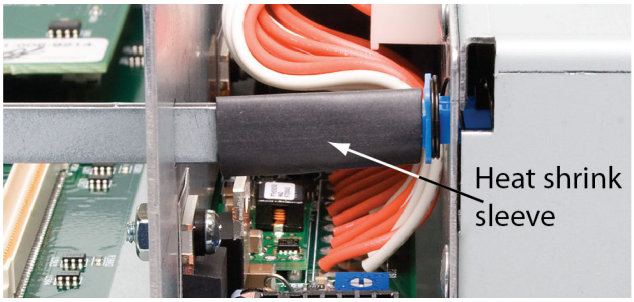
Required tool:
GC Electronics #8988 Long Reach Insulated Screwdriver or equivalent (1/8" x 12" long shaft, plastic or heat shrink insulated metal).

1) Turn off the unit and remove the power cord.

2) Locate the power switch on the power supply.

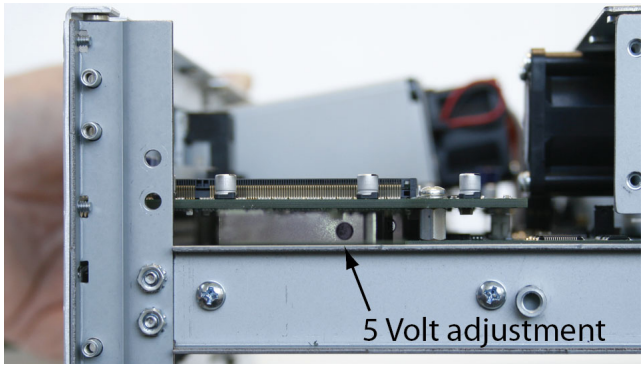


3a) (Chassis rev 0)With pliers, unsnap the coupler that attaches the actuator rod to the switch.



3b) (Chassis rev 1) Cut off the heat shrink that fixes the actuator bar to the switch.

4) Remove the seven screws on the back of the power supply that attach it to the chassis.



5) Reattach the power cord and turn the unit on.

6) Pull out the power supply slightly and tilt it up, so that the adjustment hole is visible. Insert the GC #8988 long reach insulated screwdriver underneath the circuit board and adjust the power supply for +5.0 ± 0.1 Vdc, measured at test points +5V:A, +5V:B, and +5V:C on the BRIO module.

7) Re-attach the power supply.

8a) (Chassis rev 0) Reattach the coupler that attaches the actuator rod to the switch.

8b) (Chassis rev 1) Replace and shrink the heat shrink sleeve that fixes the actuator bar to the switch.

When Service is Completed

Inspect the unit to ensure that the unit is in its original configuration - inspect and confirm that the safety ground wire (green with a yellow stripe) between the AC Mains coupler and the chassis ground post is securely attached at the coupler and the chassis post. Confirm that the fuses are the correct type and value as marked on the rear of the chassis. Perform a complete visual inspection to confirm that all assemblies are secured and properly seated and that all wire assemblies are not pinched or otherwise mis-routed.

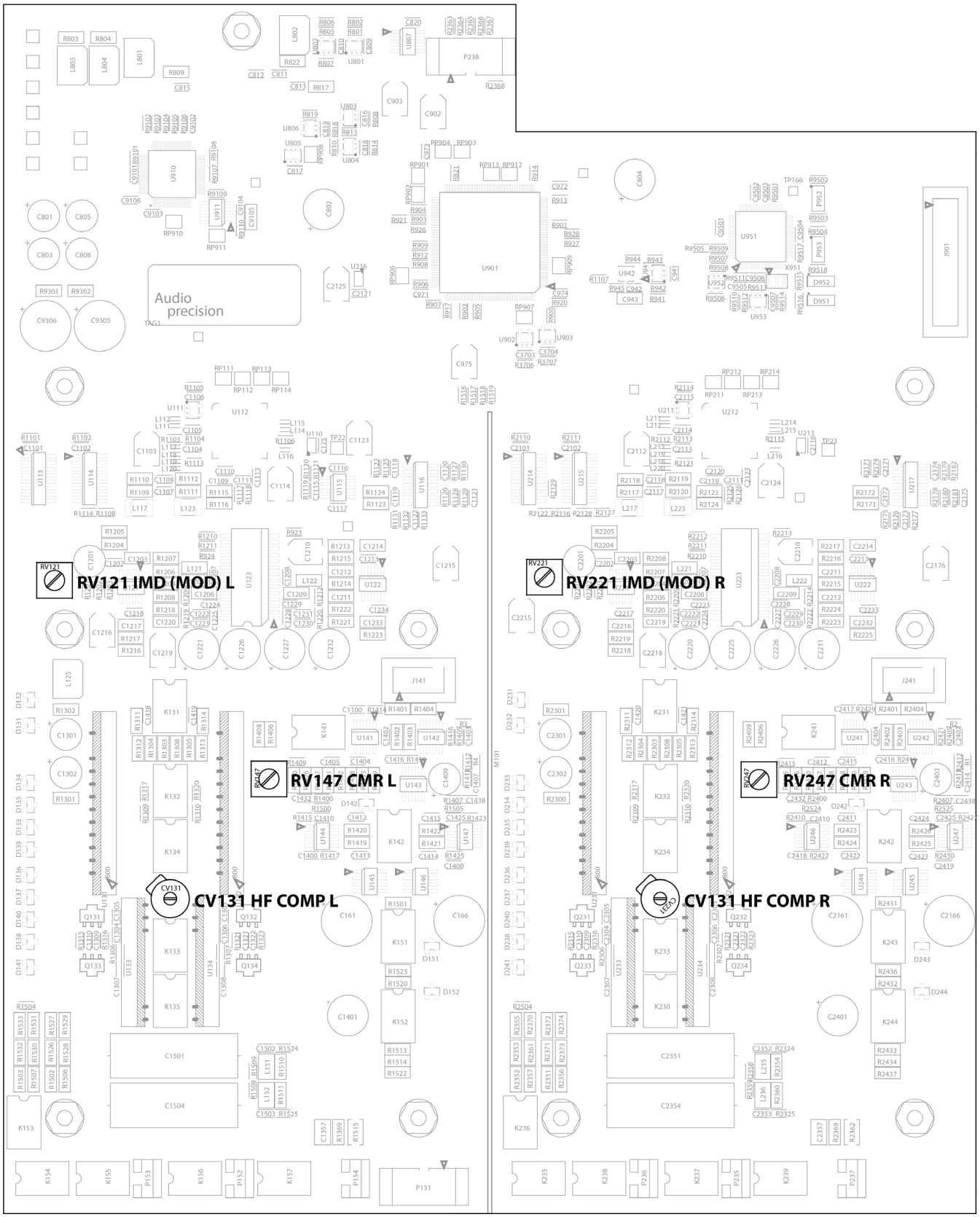


Figure 4-1 B4AI Analog Input Module (APx555) Adjustment Locations

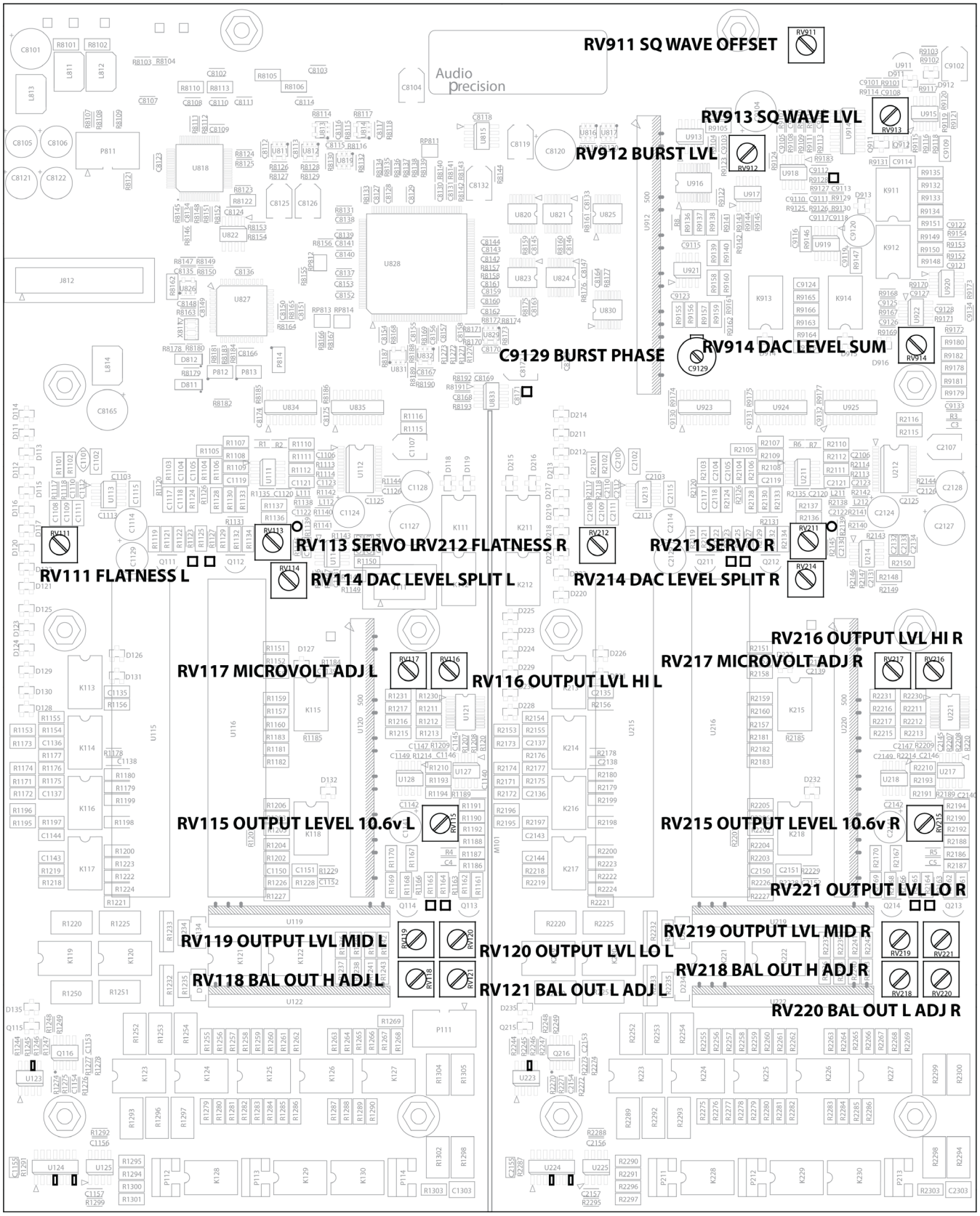


Figure 4-2 B4AO Analog Output Module (APx555) Adjustment Locations

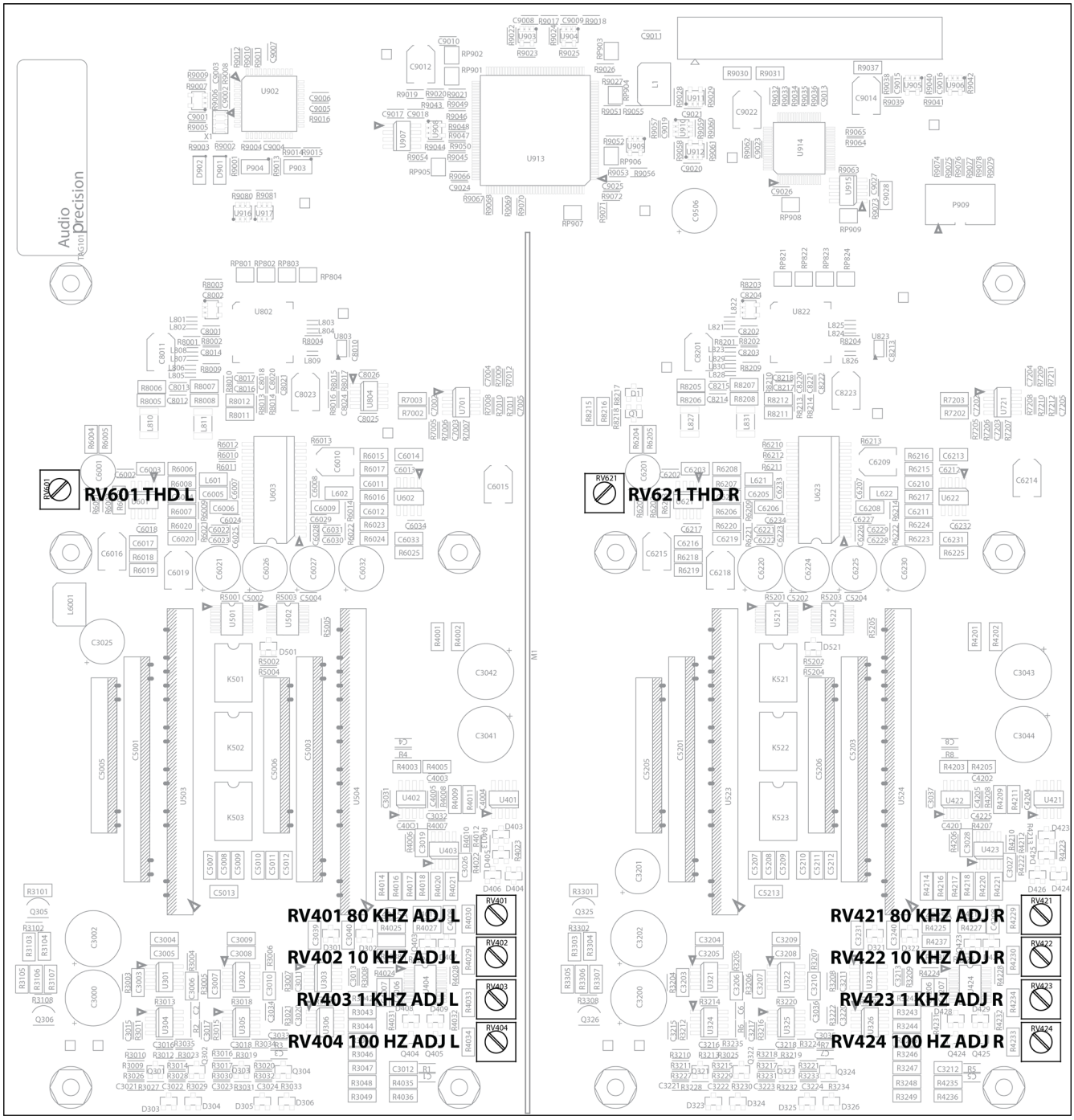


Figure 4-3 B4BR Analog Band Reject Module (APx555) Adjustment Locations

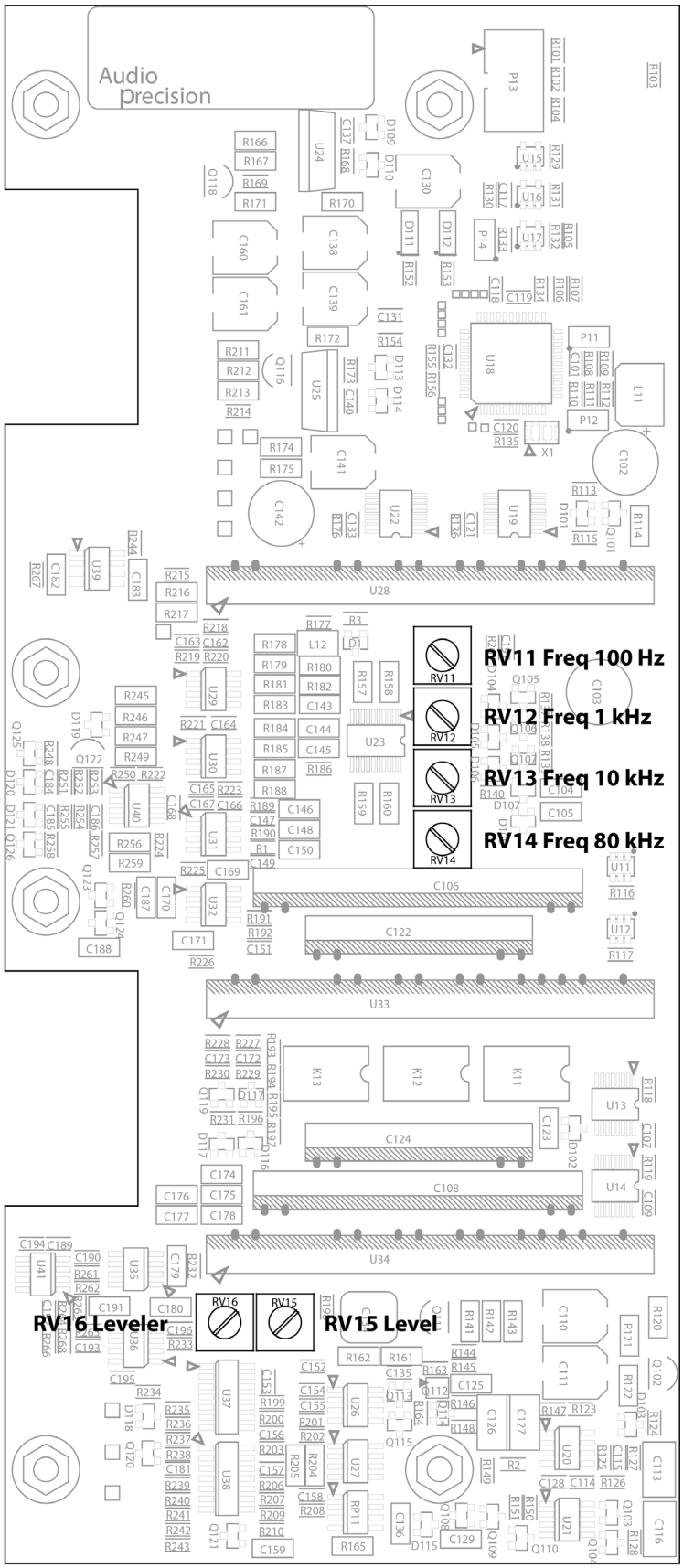


Figure 4-4 B4SG Analog Sine Generator Module (APx555) Adjustment Locations

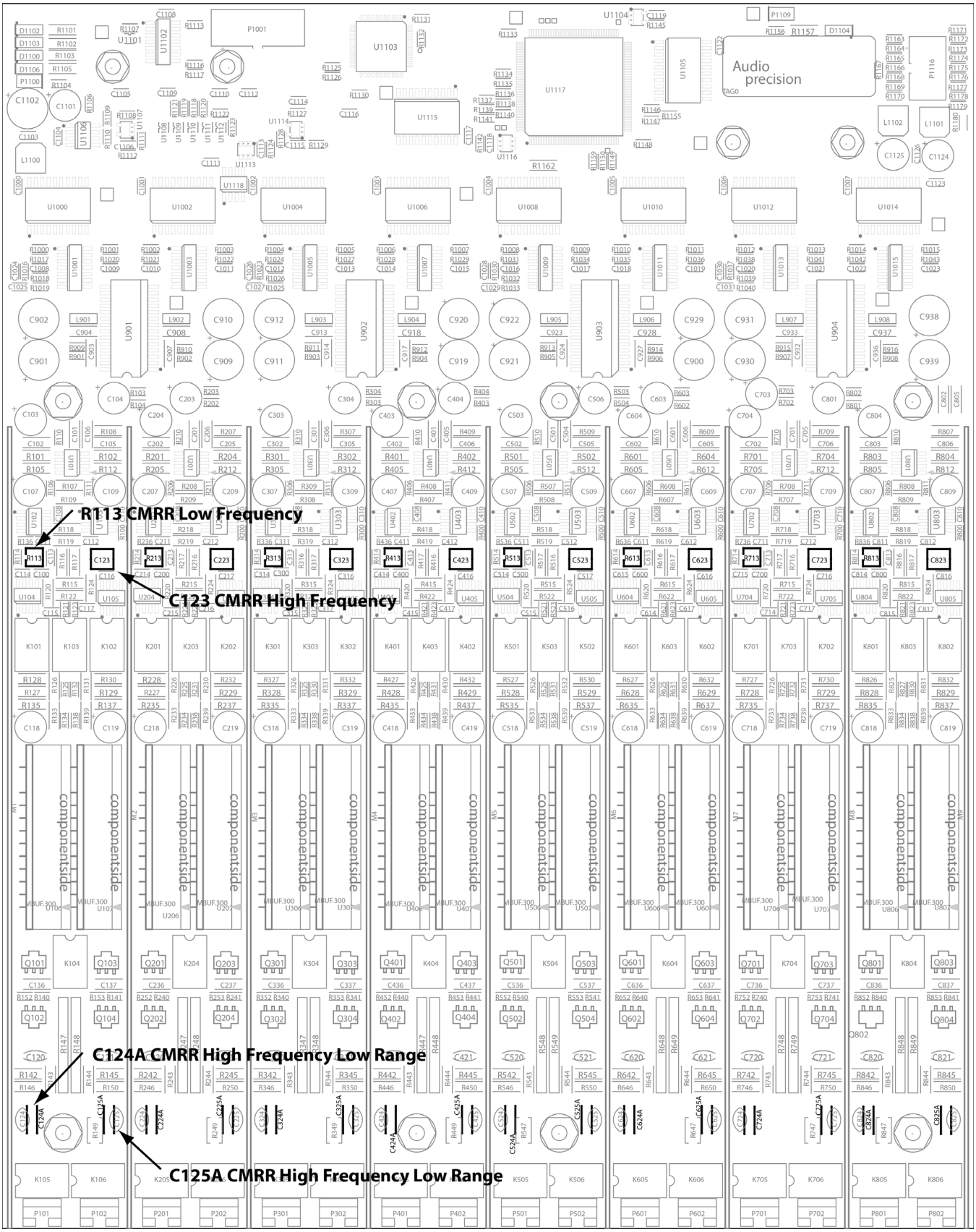


Figure 4-5 BCAS Analog Input Module (8-chan) Adjustment Locations (rev 0, 1)

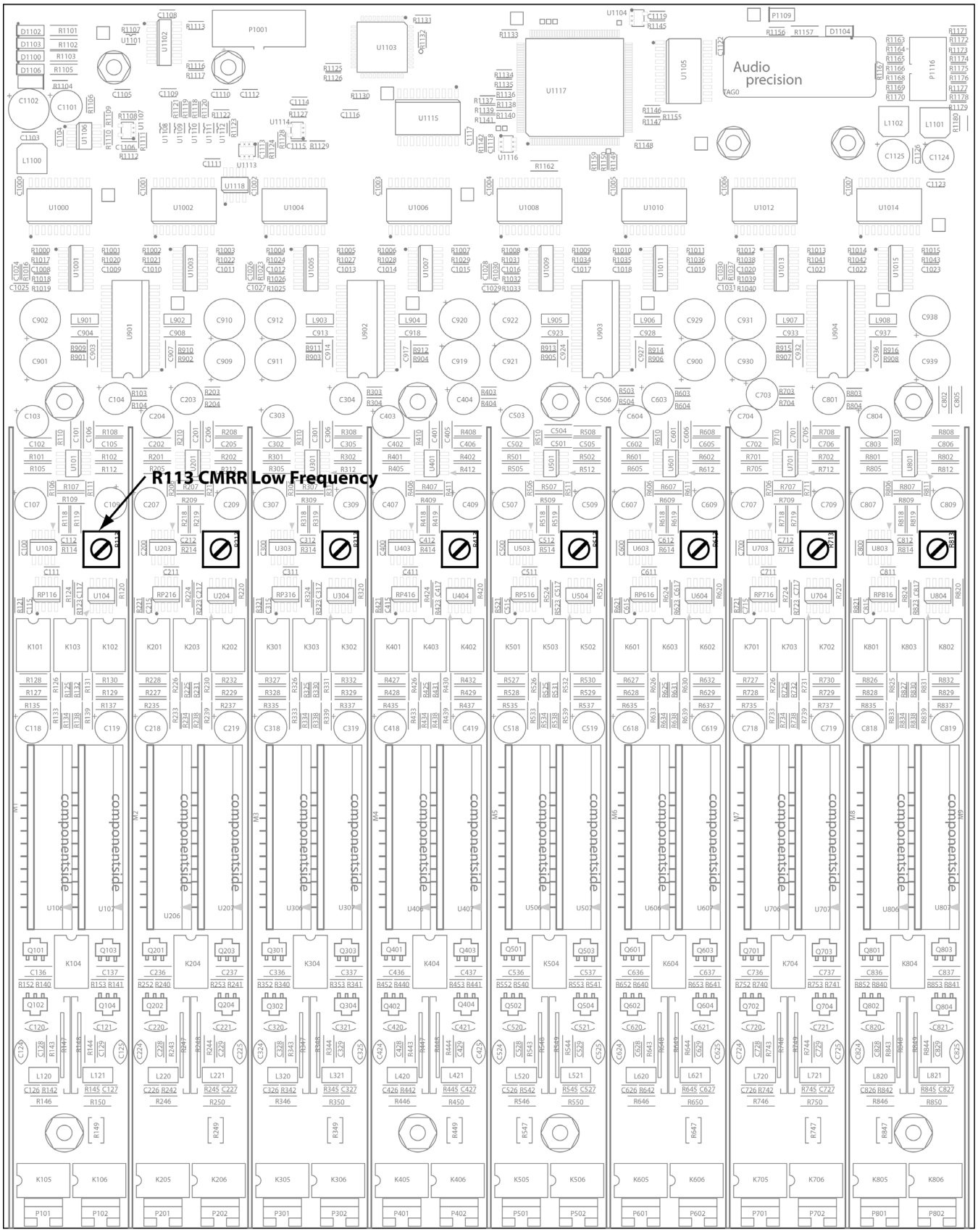


Figure 4-6 BCAS Analog Input Module (8-chan) Adjustment Locations (rev 2–4)

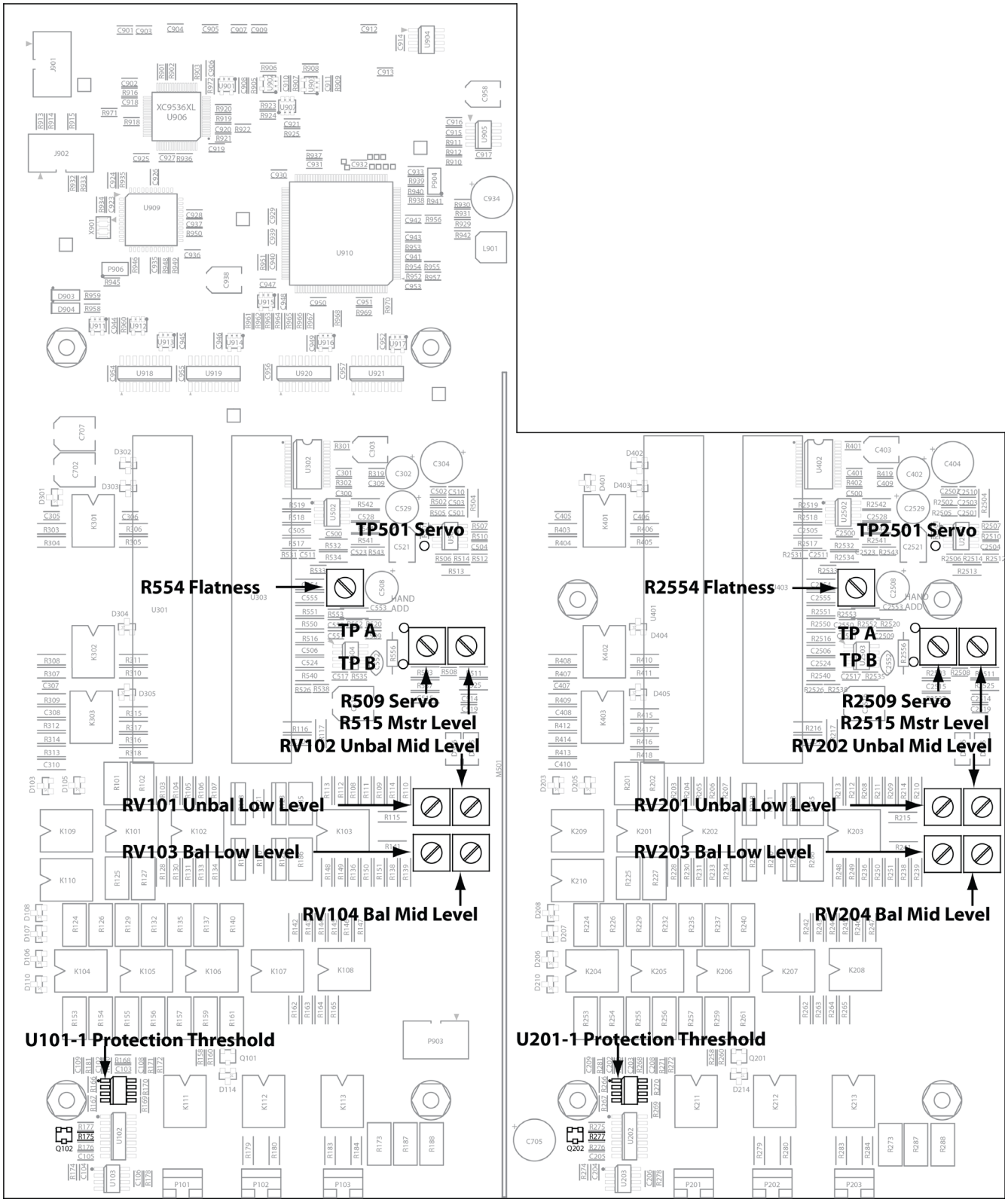


Figure 4-7 BMEG Analog Output Module (2-chan) Adjustment Locations

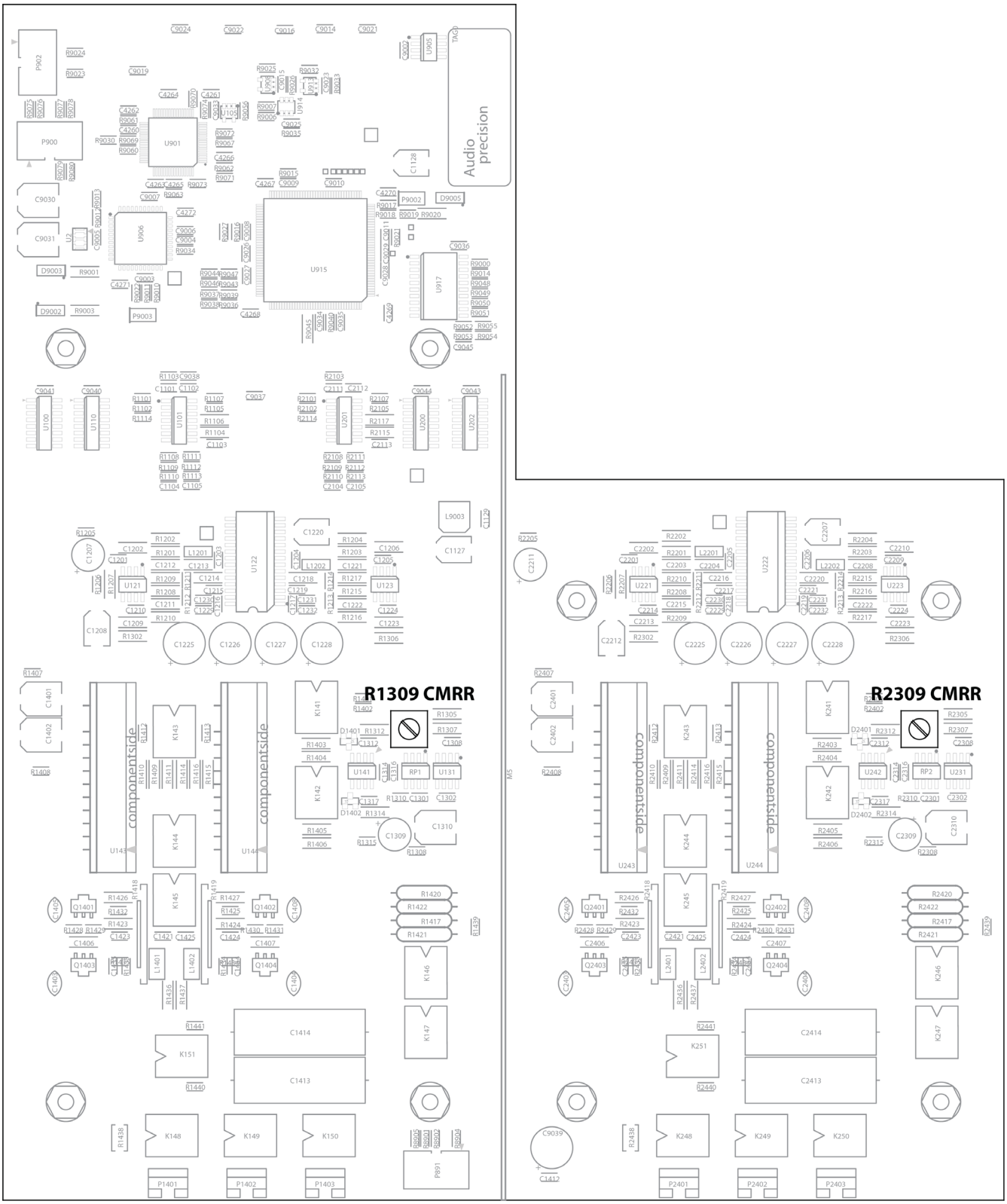


Figure 4-8 BOTA Analog Input Module (2-chan) Adjustment Locations (rev 0)

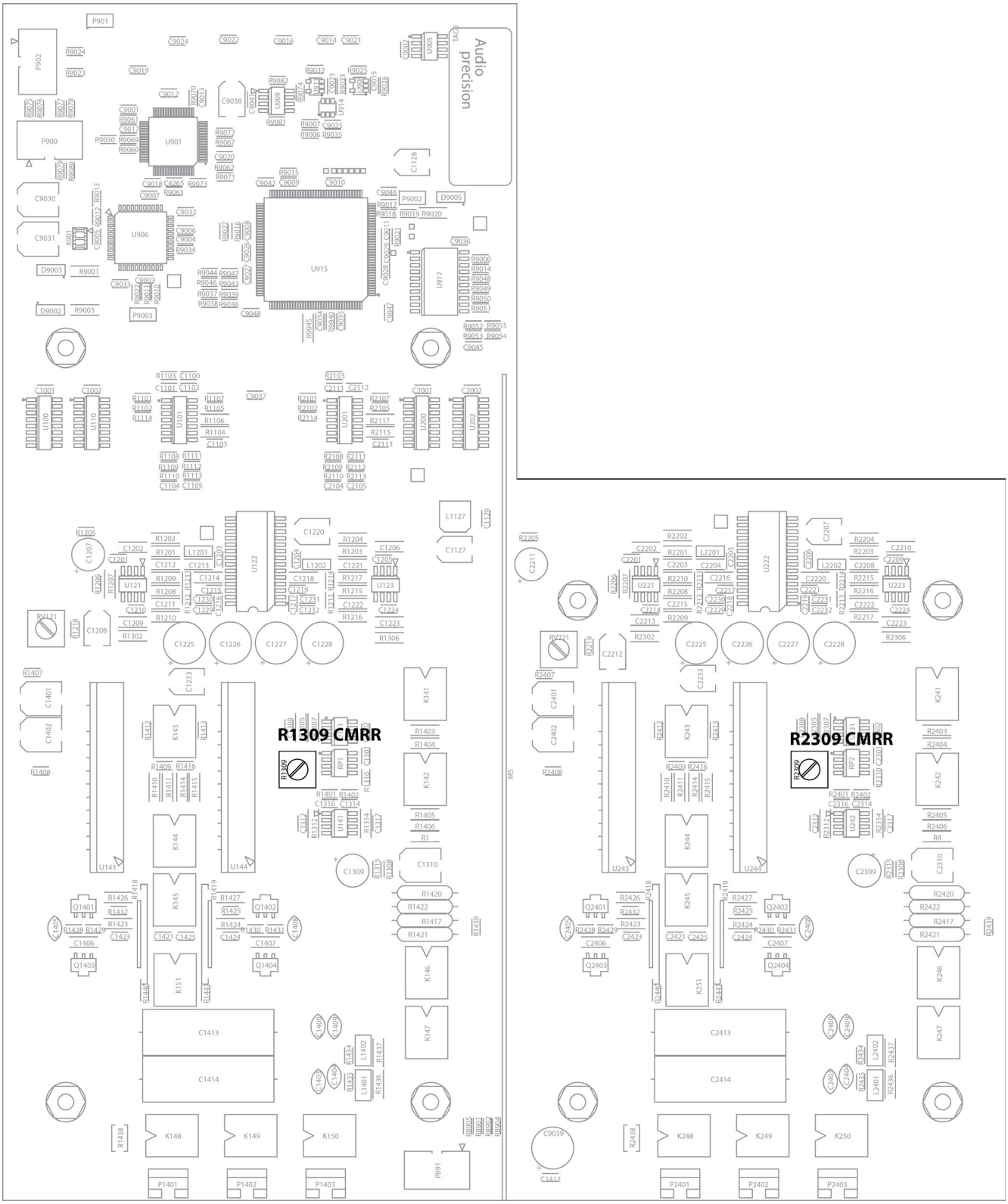


Figure 4-9 BOTA Analog Input Module (2-chan) Adjustment Locations (rev 1, 2)

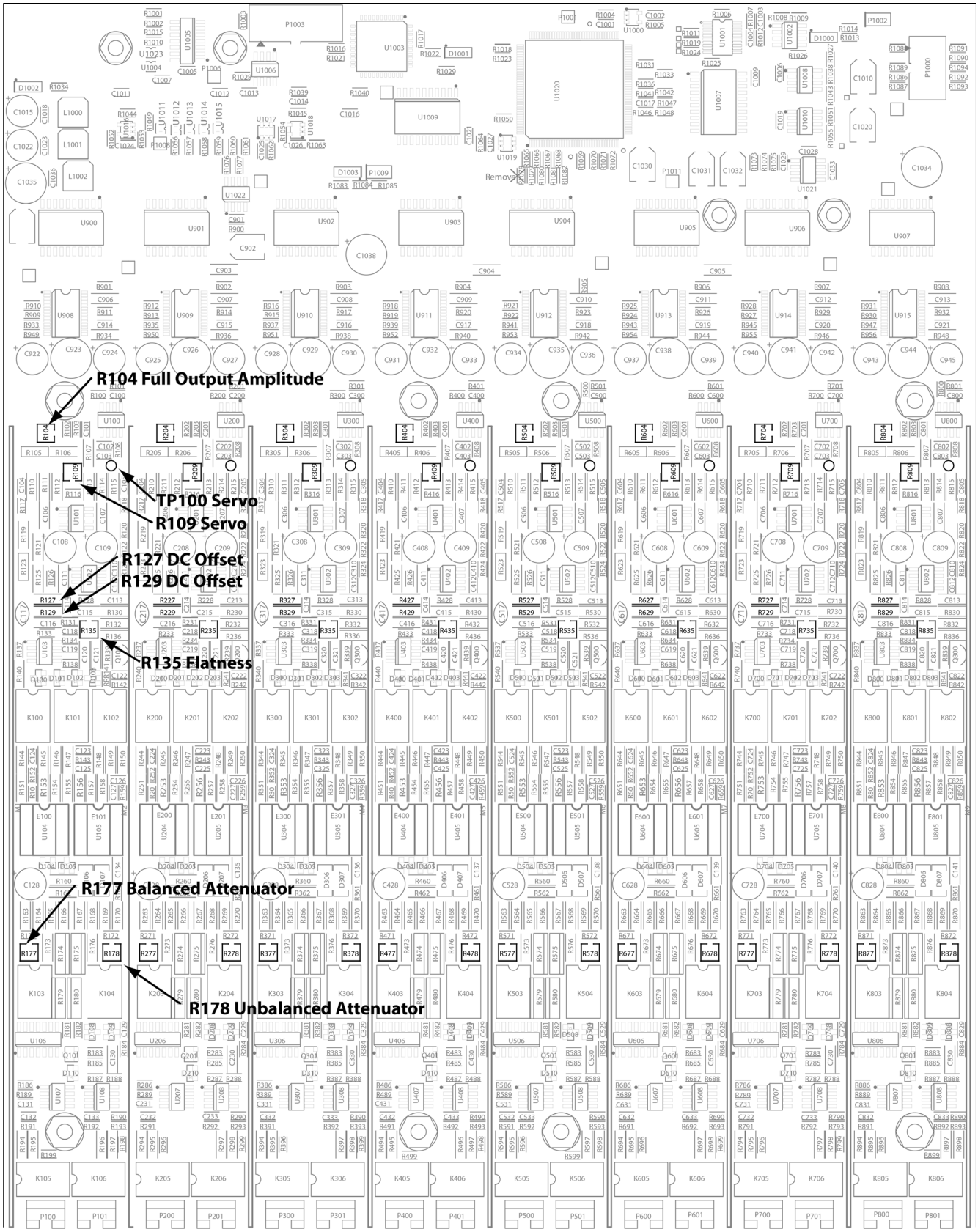


Figure 4-10 BPLX Analog Output Module (8-chan) Adjustment Locations (rev 0, 1)

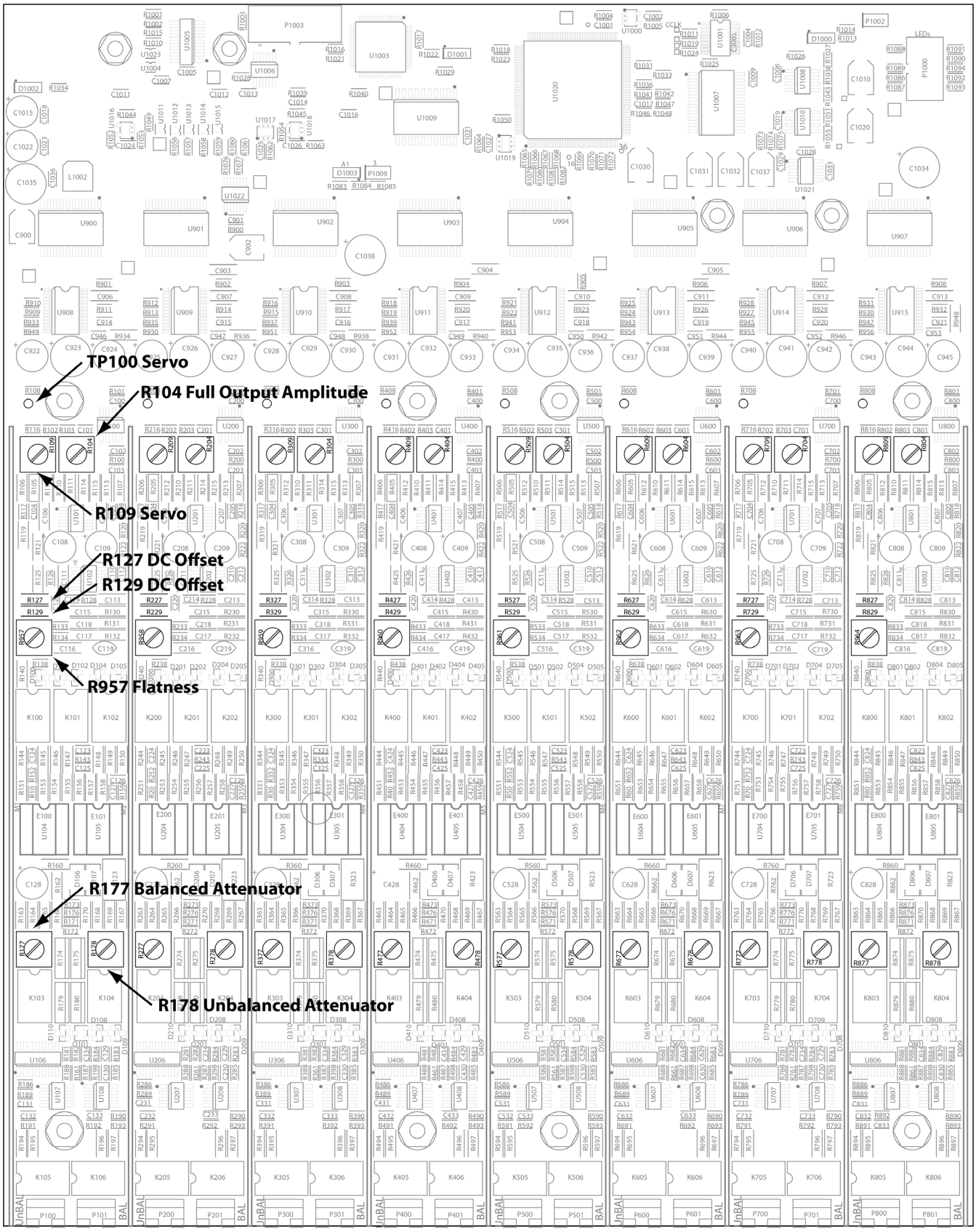


Figure 4-11 BPLX Analog Output Module (8-chan) Adjustment Locations (rev 3–5)

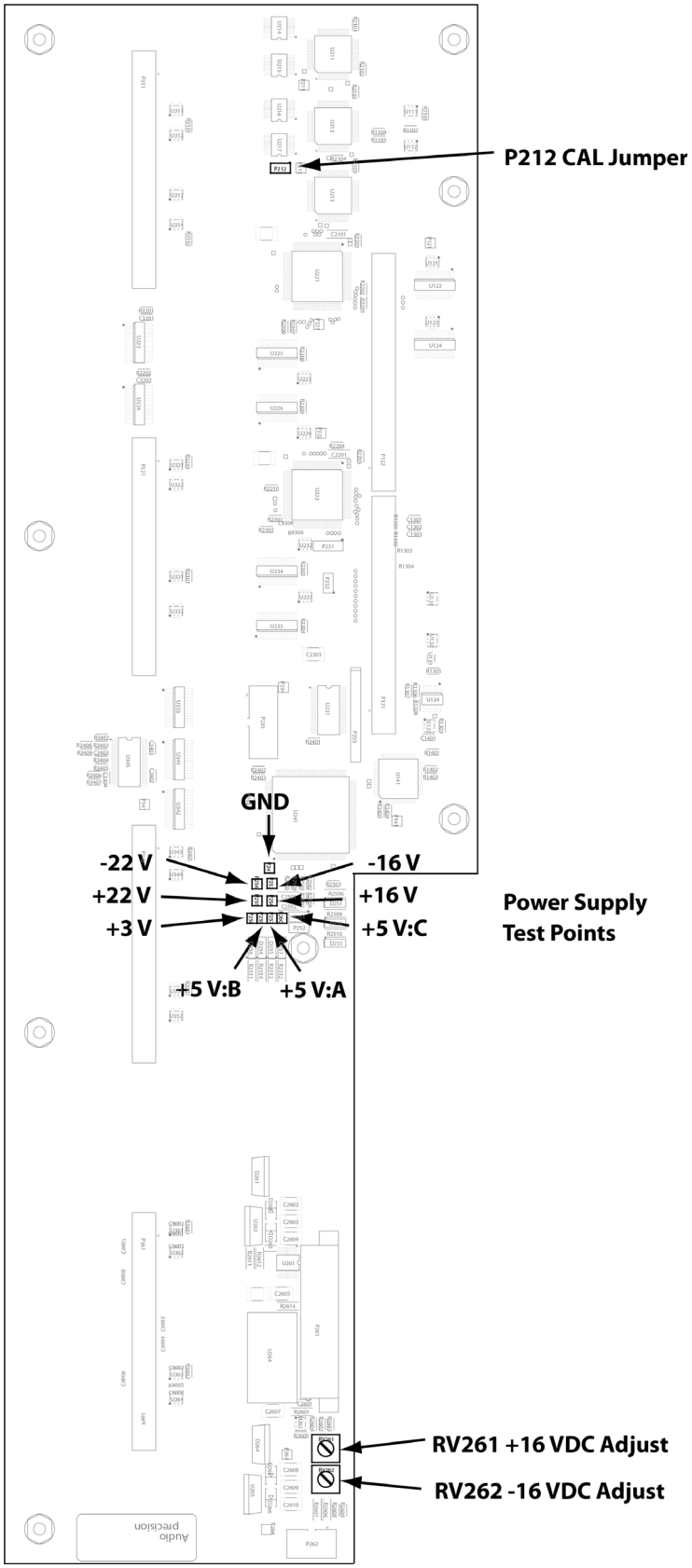


Figure 4-12 BRIO Distribution Module Adjustment Locations (rev 0–2)

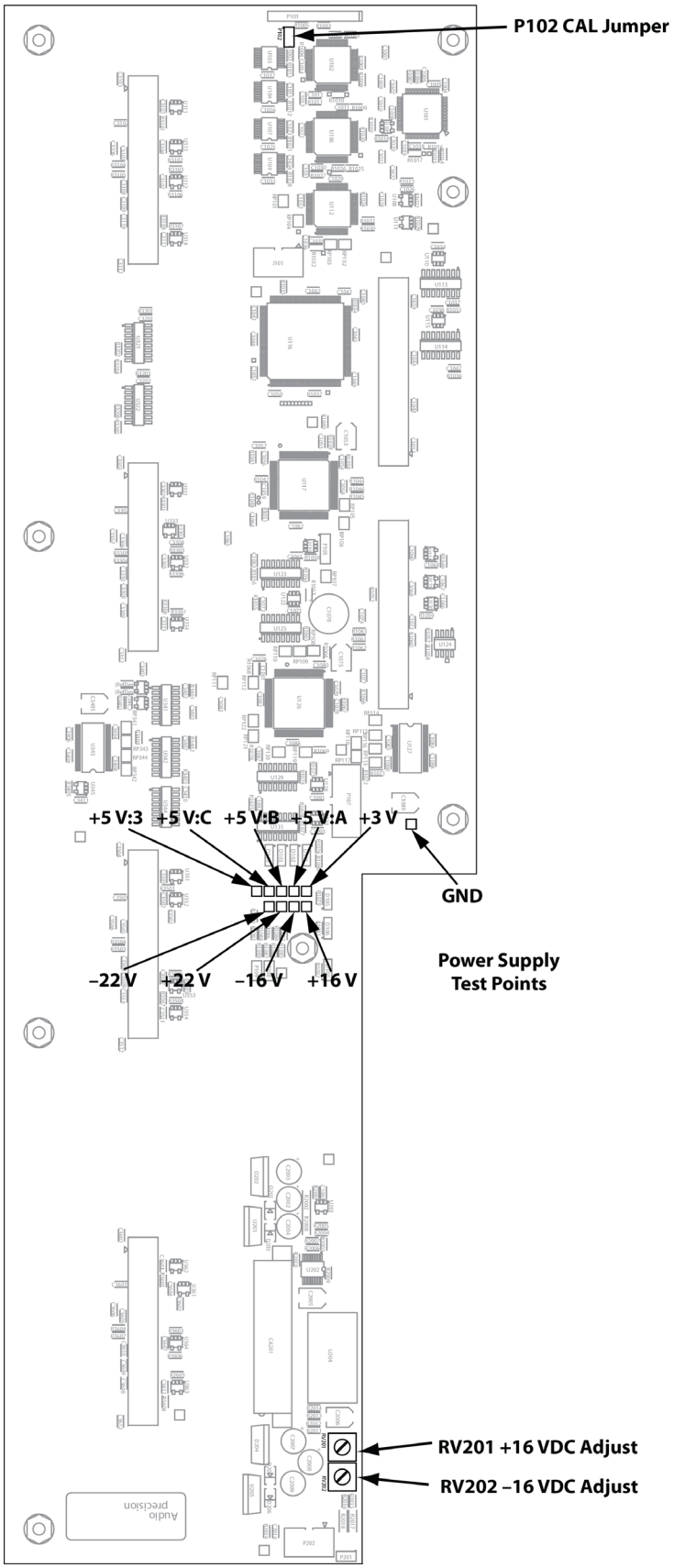


Figure 4-13 BRIO Distribution Module Adjustment Locations (rev 3–5)

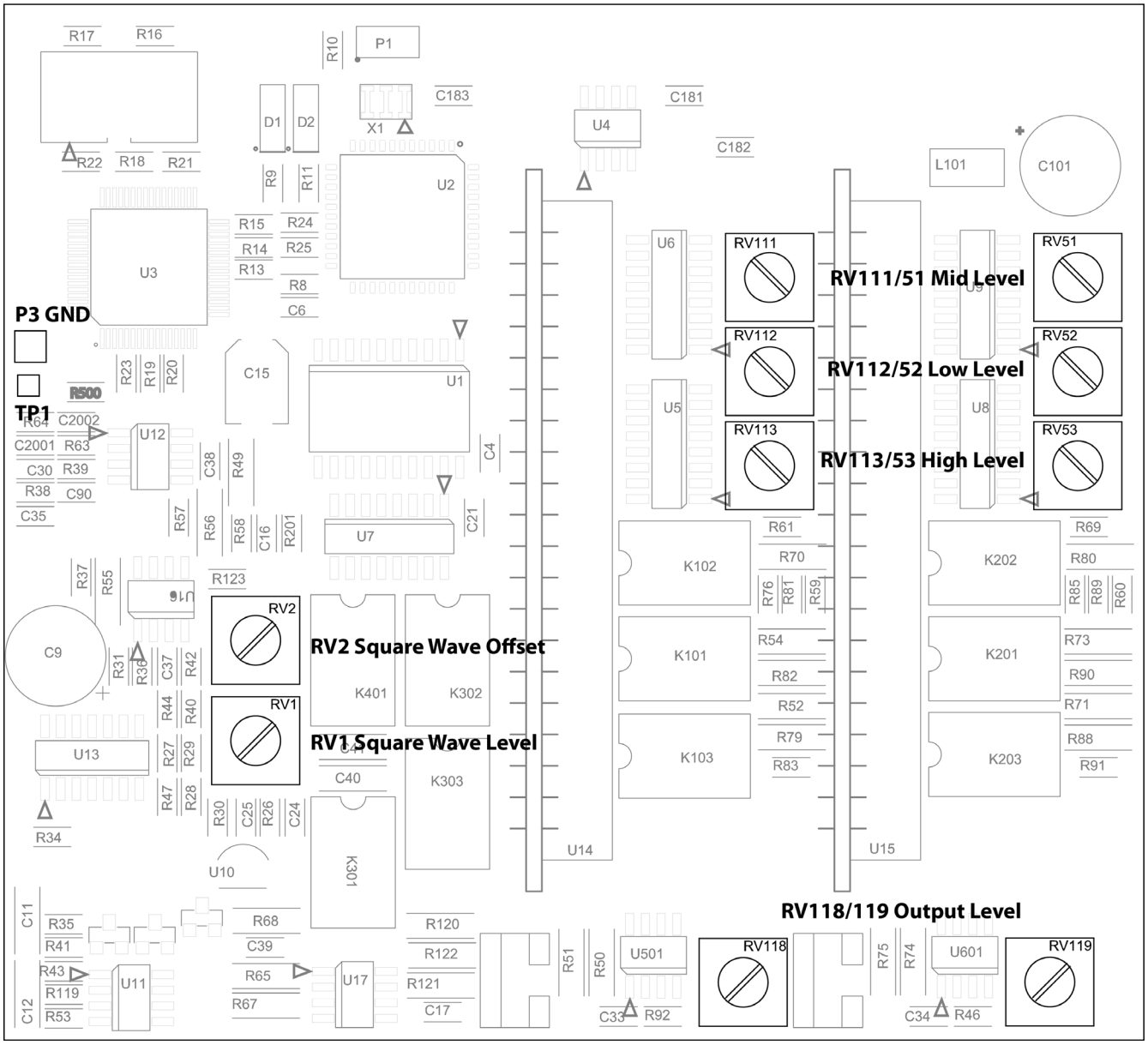


Figure 4-14 BSAT AG52 Analog Generator Option Module Adjustment Locations

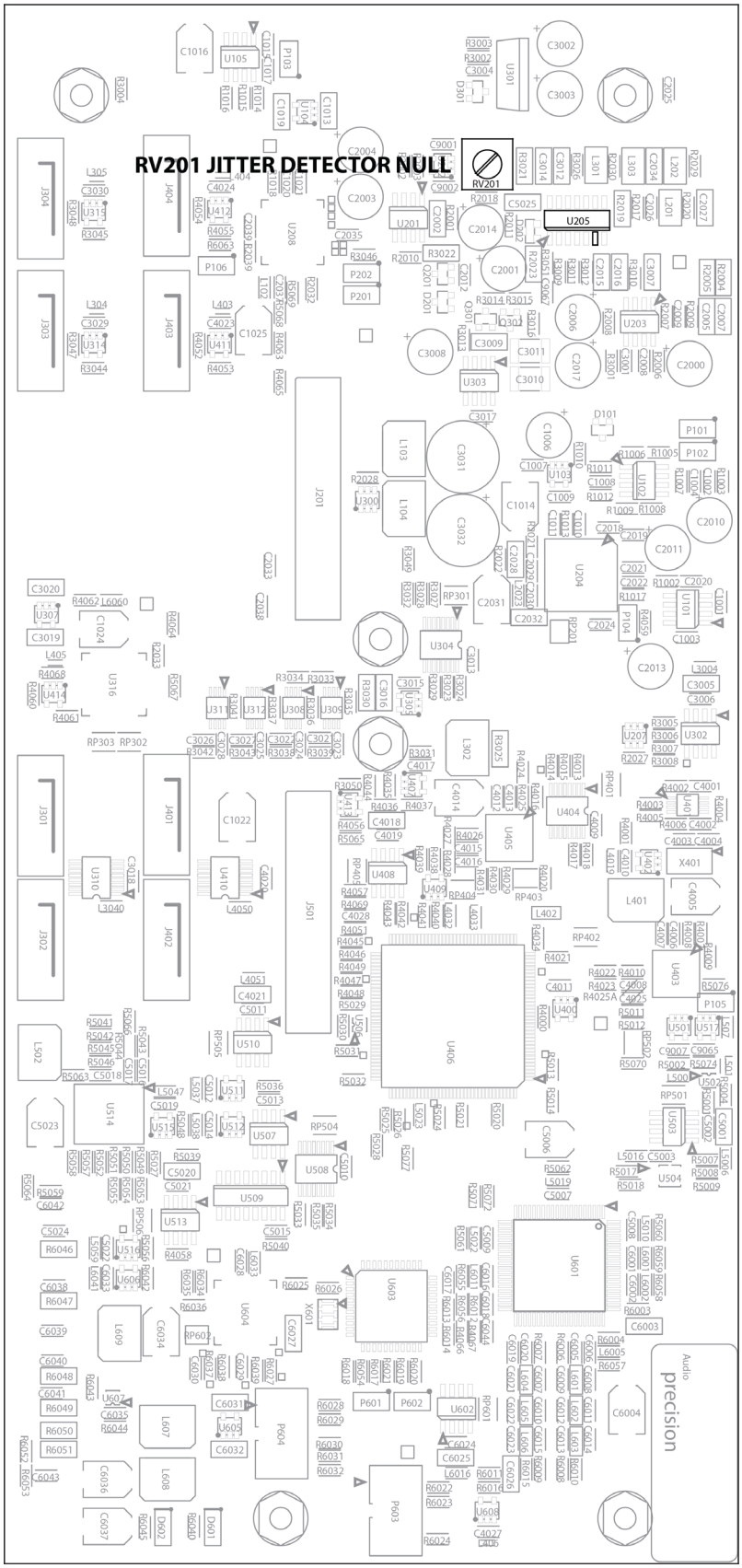


Figure 4-15 BSL2 Advanced System Clock Module Adjustment Locations

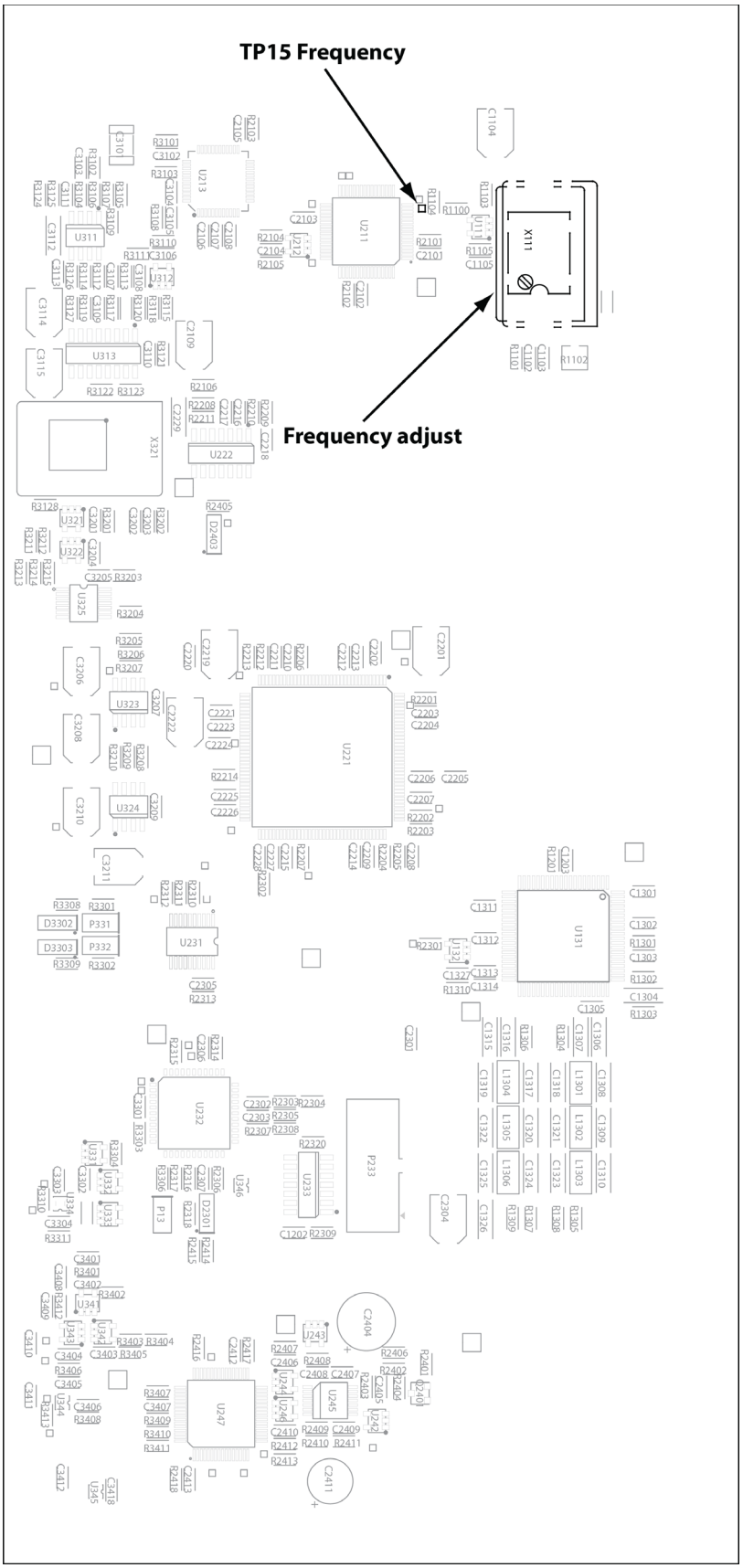


Figure 4-16 BSOL System Clock Module Adjustment Locations

Section 5: Self Test

5.1 Introduction

The APx500 Series Service Package includes the APx Self Test, which checks all major aspects of the instrument's performance against published specifications. Running Self Test periodically is a good way to verify that the instrument is performing as expected. It is also a valuable aid to help determine if an observed problem is internal or external to the instrument. Before calling for service, run Self Test to help us pinpoint the problem area and recommend a course of action.

Self Test is not a substitute for calibration. Calibration is a higher level of verification that compares the instrument's performance to highly accurate lab test equipment. Calibration can only be performed at the AP factory or at selected international distributors.

5.2 Required Cables

The cables needed to run the Self Test provide an external loopback path from the generator to the analyzer for each type of analog and digital connection. You may provide your own cables, or may order from among the instrument-specific cable kits listed in Section 4. In addition to the listed kits, an HDMI cable will be necessary when testing instruments with HDMI.

CAB-HDMI (for APx585 with HDMI option):

AP P/N	QTY	Description
4112.0002	4[1]	HDMI to HDMI Cable

1. Only one cable is needed for the Self Test.

5.3 Installing the Service Package Files

APx500 measurement software must already be installed before copying the files provided in this download. The adjustment projects require the specific version of APx500 measurement software indicated in the Readme.txt file of the download. The APx500 software may be downloaded from ap.com. If this version is different than the version you are currently running, it may be installed concurrently in a separate directory.

Copy the \Addins folder to \Program Files (x86)\Audio Precision\APx500 x.x\Addins. Copy the \Service folder to a convenient location, such as \My Documents\Audio Precision\APx500 x.x\Service. In both cases, x.x represents the version of APx500 that is required.

5.4 Running Self Test

We recommend that you check the Downloads section of AP.com for the latest version of Self Test and update the files as necessary.

Instructions for running Self Test are provided in the \Service\SelfTest folder.

Turn on the instrument and allow it to warm up and stabilize for 30 minutes before starting Self Test.

5.5 Self Test Reports

Once started, except for prompts to attach cables, Self Test will run automatically and generate an on-screen report when it is done. The top of the report will show an overall Pass or Fail result, and then each section of the report will show a series of measurement results, followed by an indication of pass (in green) or fail (in orange). If any test fails, verify that the cables are correctly connected and rerun the test. If the test still fails, contact AP or your local international distributor for additional assistance. We recommend that you save the report and rename the file to include the instrument serial number and test date. In this way, you will be able to compare prior and current results, and will be able to send the report

to AP if requested by our technical support department.

Section 6: Maintenance and Repair

6.1 Introduction

This section and the sections that follow provide basic information for the maintenance and repair of the instrument. The field repair of any APx500 Series circuit board assembly or module is NOT authorized except under very special circumstances, under the direction of the Audio Precision factory.

6.2 Cleaning

Audio Precision recommends that its measurement instruments be cleaned and examined at least once every two years for internal dust accumulation. Exposure to harsh or severe operating environments may dictate more frequent cleaning. Dust buildup interferes with the ability of many components to cool properly. In extreme cases dust can also create conductive paths that may adversely affect electrical performance.

Remove accumulated dust on the exterior with a soft cloth or small brush. A mild detergent may be used to remove remaining dirt or stains. Do not use strong or abrasive cleaners. Wipe all surfaces clean with a damp cloth. Connectors can be cleaned with a cotton swab or soft cloth dampened in isopropyl alcohol or water. Digital signal connectors should be inspected for damaged pins.

Remove accumulated interior dust with clean, dry, low pressure air or a static free vacuum. A soft, dry brush may be required to loosen particles that resist removal. Always use good static control procedures when handling or cleaning circuit assemblies to avoid component damage.

Also examine the cooling fan for dust accumulation on the leading edge of the blades. Dust build-up can unbalance the fan and increase acoustic noise. Clean the blades with a cotton swab dampened in isopropyl alcohol or water.

6.3 Module Locations

Drawings showing module and hardware locations are in Section 3. Most repairs are accomplished by sending defective modules to the factory or regional service center for repair or exchange, after contacting AP technical support.

6.4 Soldering Technique

Component level repair should only be performed under the direction of the Audio Precision factory. Most components are surface mounted, and require specialized solder tips or hot air tools for proper removal and replacement. All flux residue must be removed from the boards after soldering.

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

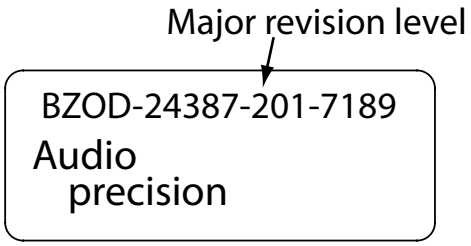
Section 7: Component Locations

7.1 Introduction

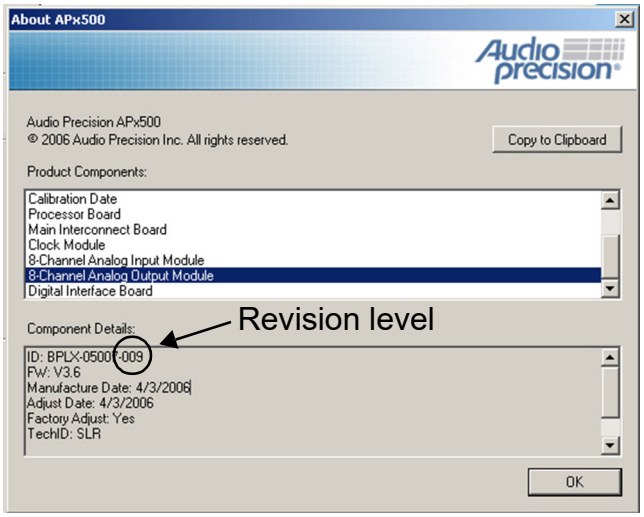
This section contains printed circuit board (PCB) drawings showing the locations of components, cable connectors, and adjustment points. Note that some boards have multiple versions due to revisions for periodic improvements. All information is believed to be accurate as of the publication date; however, Audio Precision reserves the right to make changes without prior notice.

7.2 Identifying PCB Revisions

Each printed circuit board has a tag that identifies the three-digit revision level. In the example below, the revision level of the BZOD PCB is 201. The major revision is indicated by the first of the three digits, and is noted on the diagrams that follow. In the example below, the major revision level is 2.



You can also determine the version number of individual boards in your unit by going to Help > About in the APx500 measurement software.



In the example above, the three-digit revision level of the BPLX board is 009, and the major revision level is 0.

Revision levels are indicated in the following drawings by the abbreviation “Rev n”.

Component and Assembly Designators

A	Assembly	**L**	Inductor
BT	Battery	**P**	Connector, male
C	Capacitor, fixed or variable	**Q**	Transistor, FET, or SCR
D	Diode	**R**	Resistor, fixed or variable
E	Socket or mechanical part	**S**	Switch or contact
F	Fuse	**TP**	Test point
H	Heat sink or mounting hardware	**U**	Integrated circuit
HS	Heat sink or mounting hardware	**W**	Wire strap or cable
J	Connector, female	**X**	Transformer
K	Relay	**Y**	Crystal

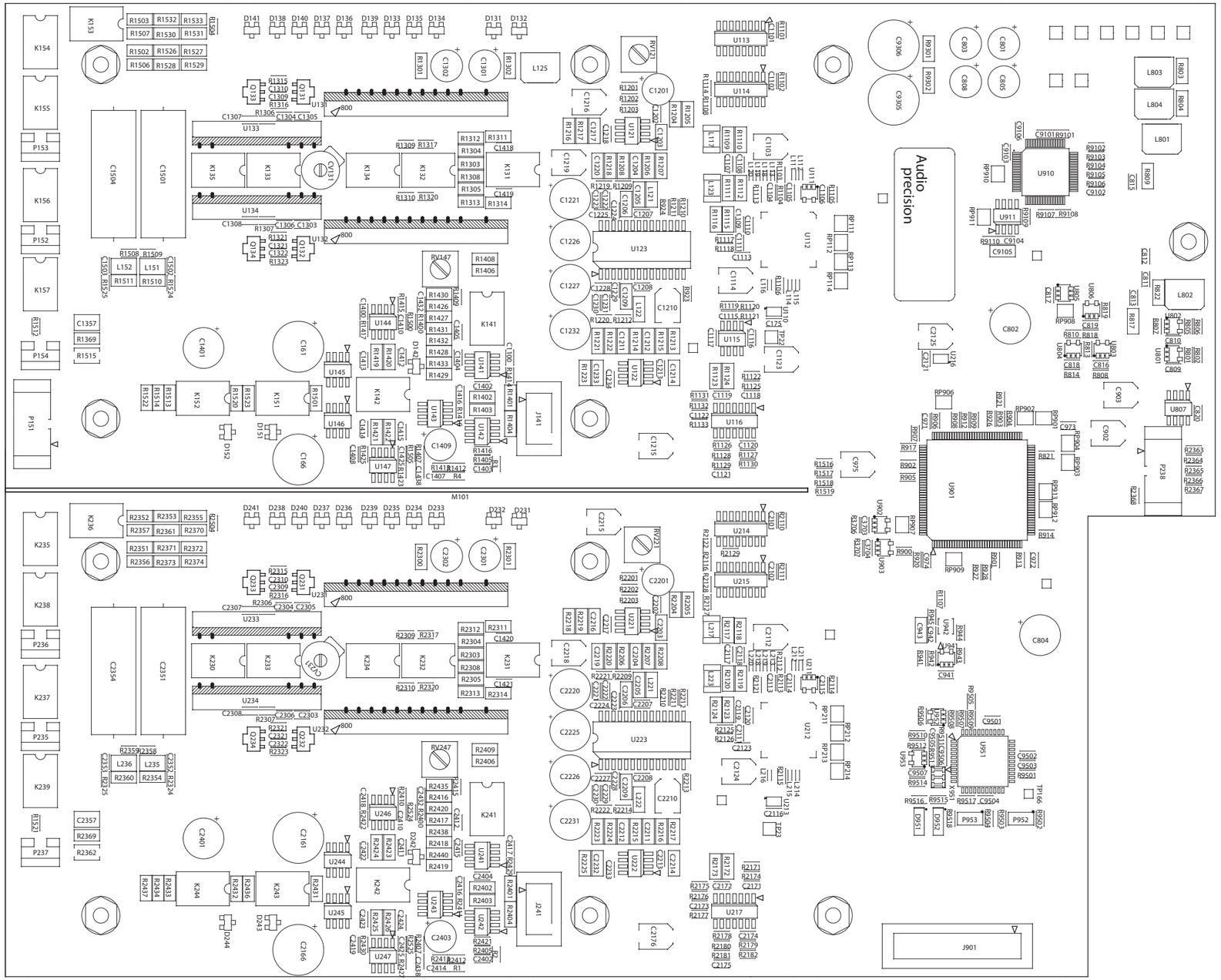


Figure 7-1 B4AI High Performance Analog Input (top) Rev 0

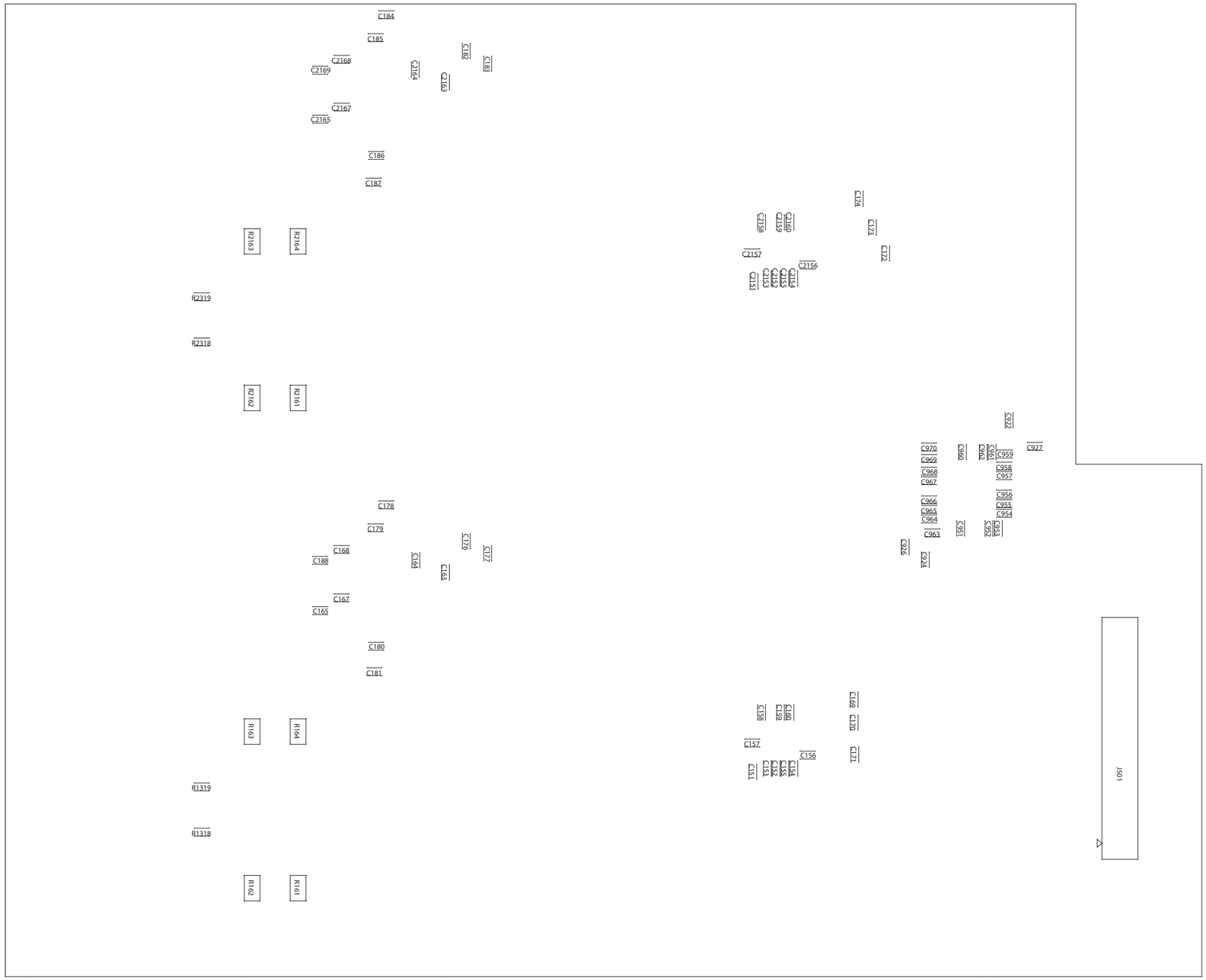


Figure 7-2 B4AI High Performance Analog Input (bottom) Rev 0

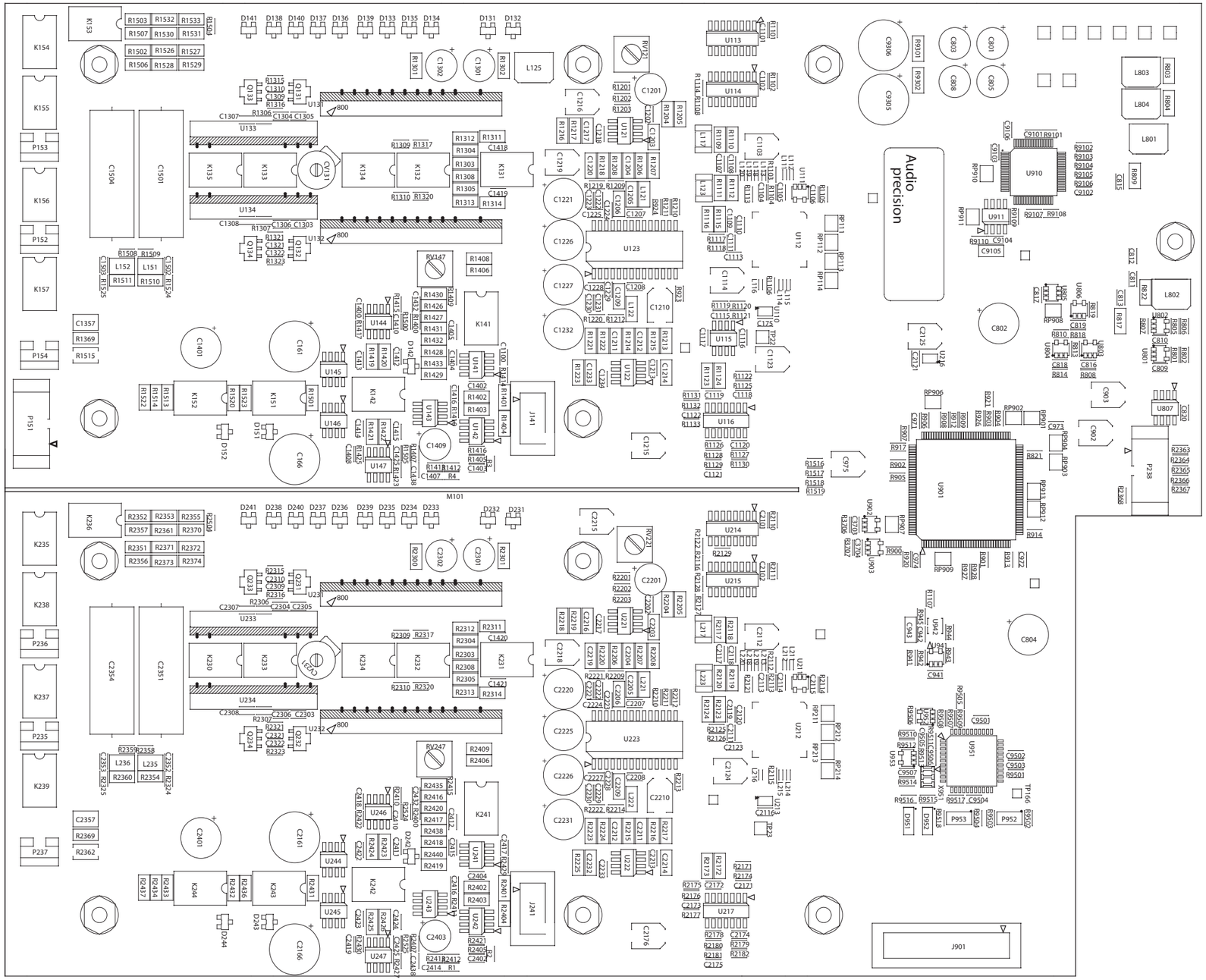


Figure 7-3 B4AI High Performance Analog Input (top) Rev 1

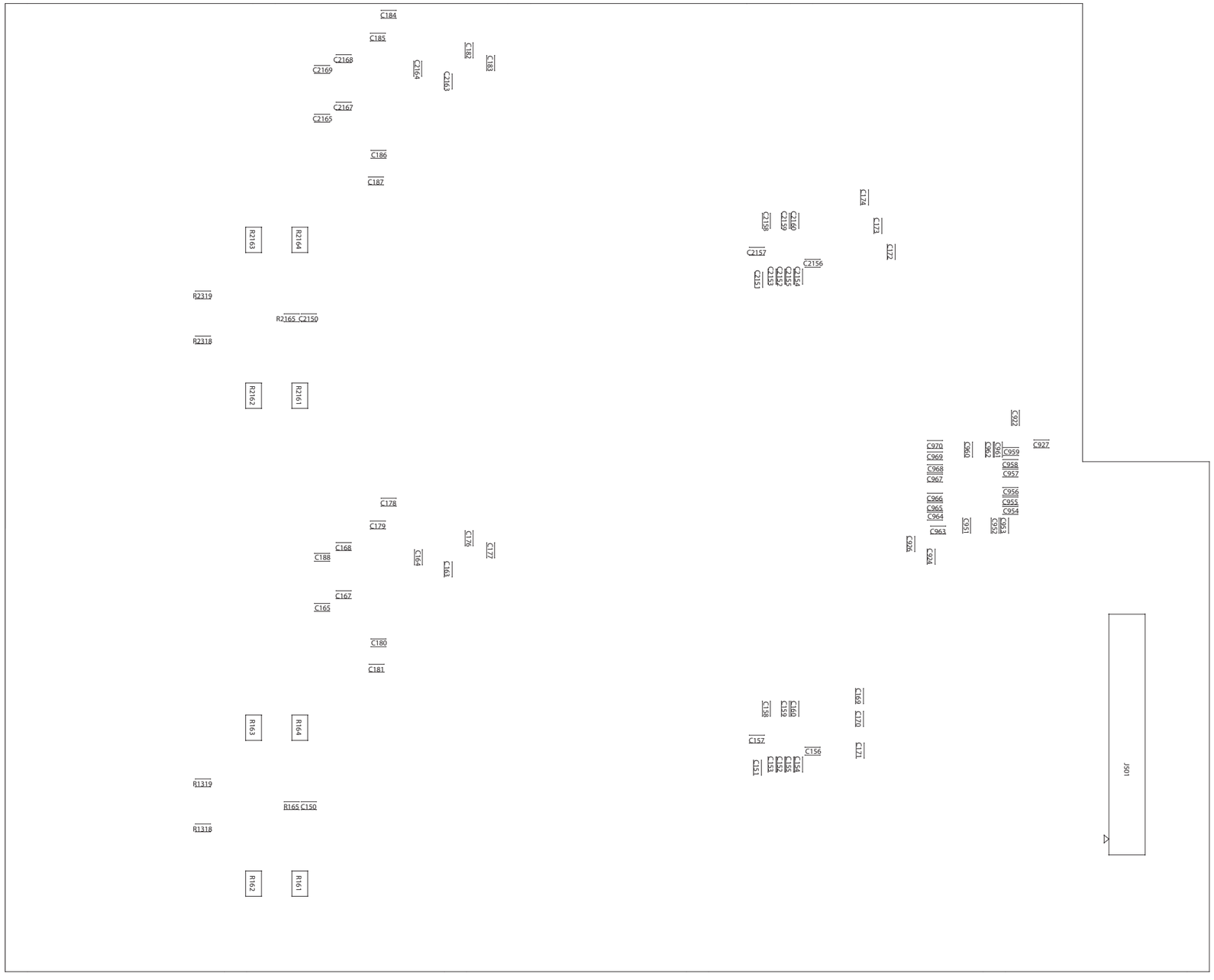


Figure 7-4 B4AI High Performance Analog Input (bottom) Rev 1

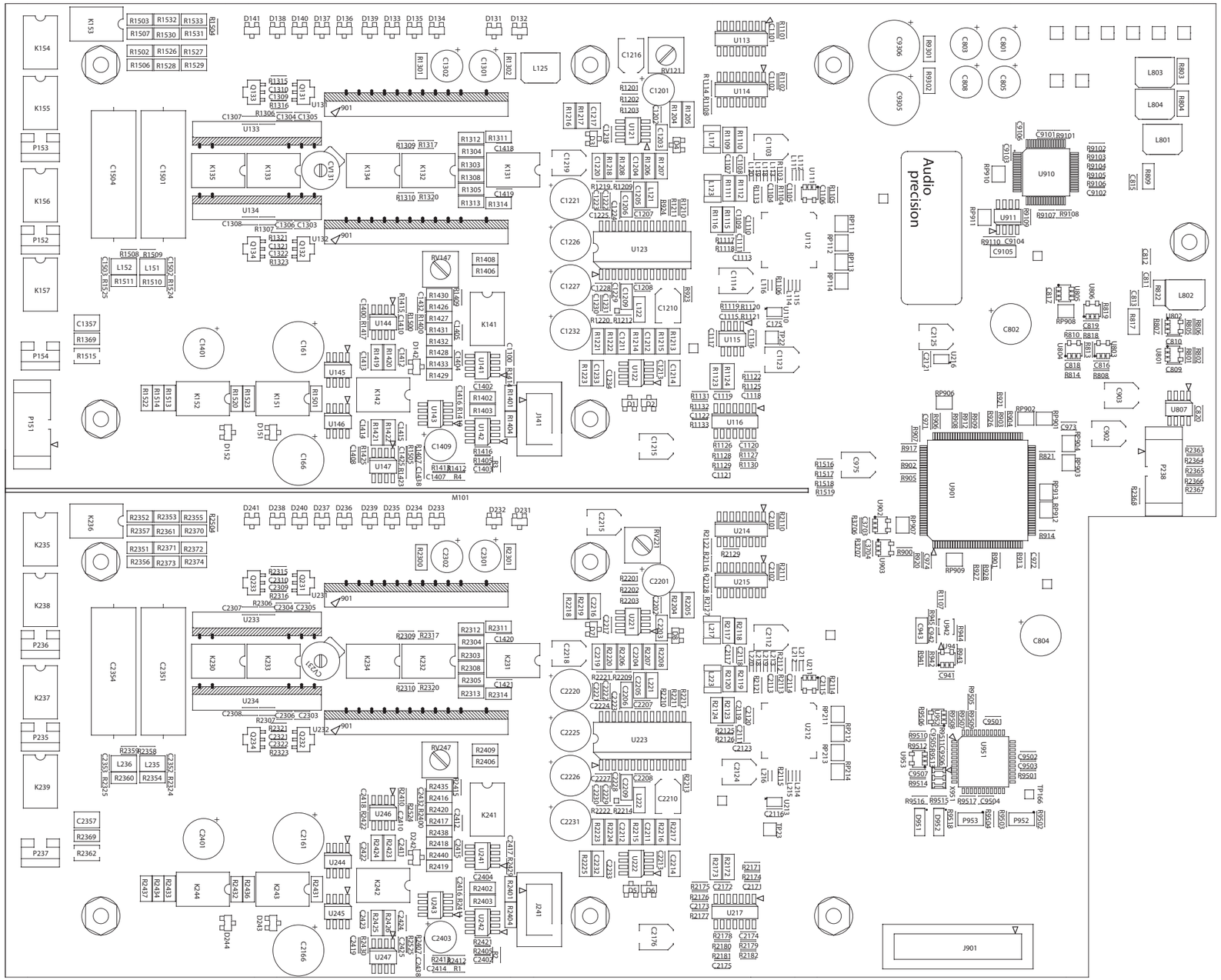


Figure 7-5 B4AI High Performance Analog Input (top) Rev 2

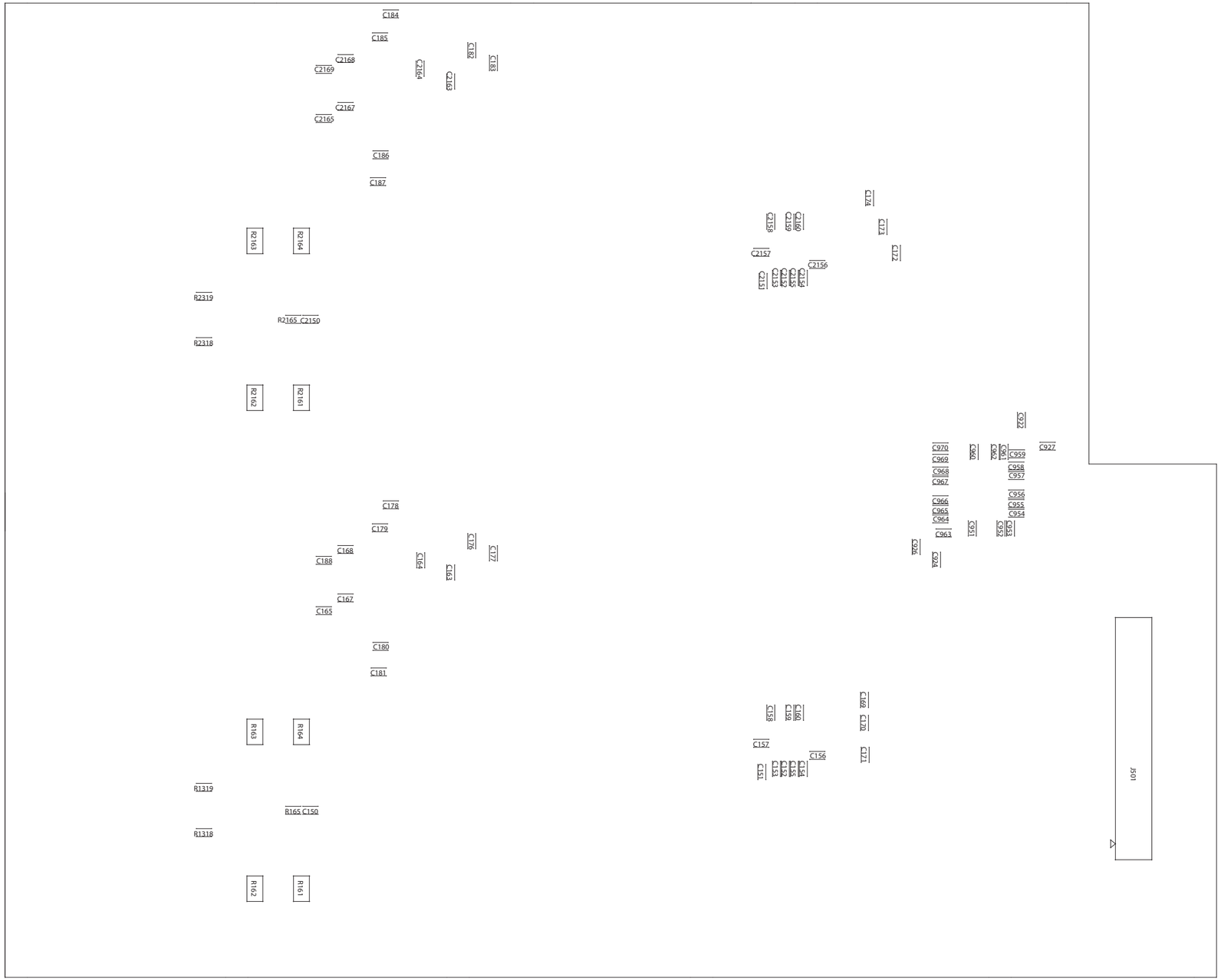


Figure 7-6 B4AI High Performance Analog Input (bottom) Rev 2

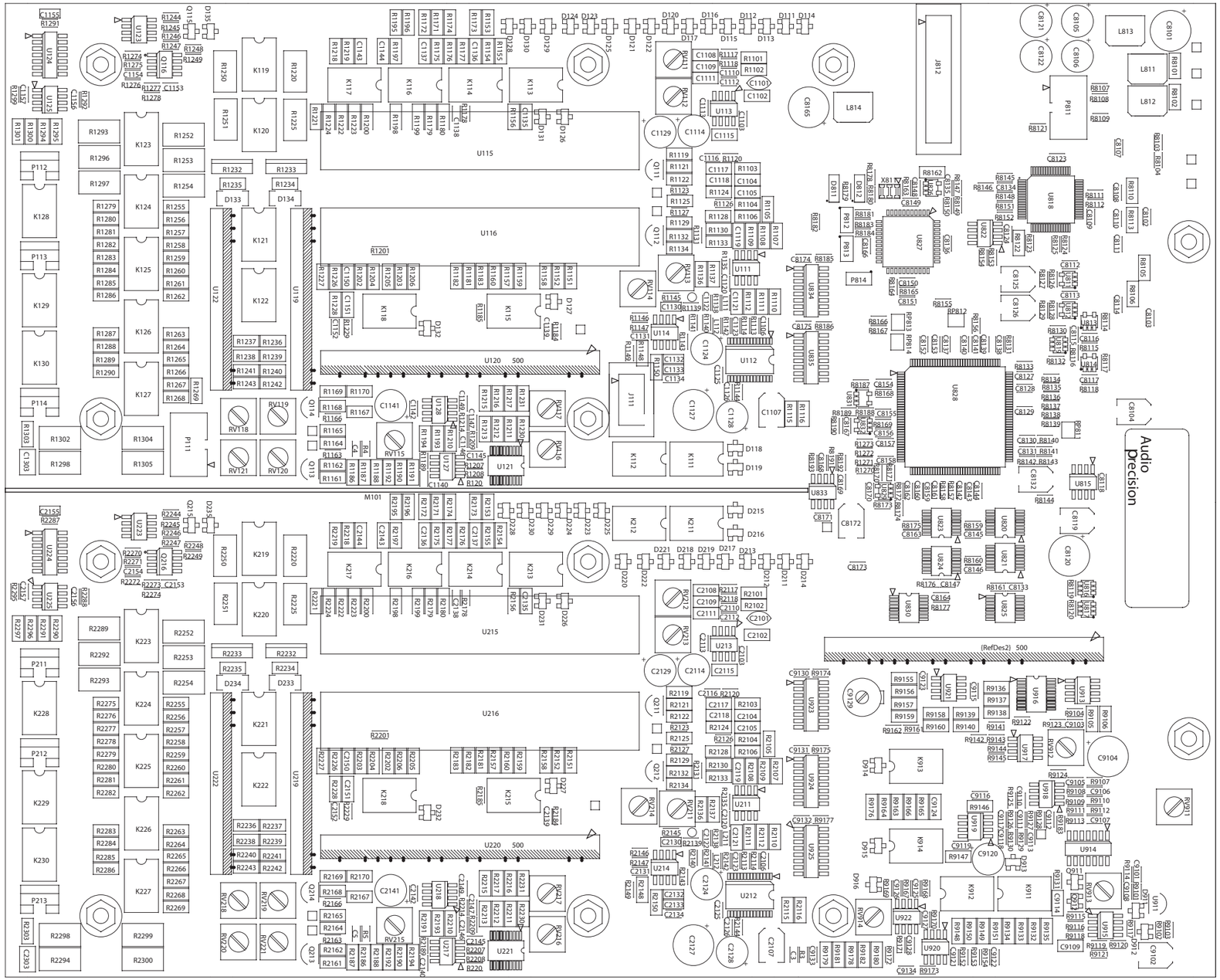


Figure 7-7 B4AOHigh Performance Analog Output (top) Rev 0

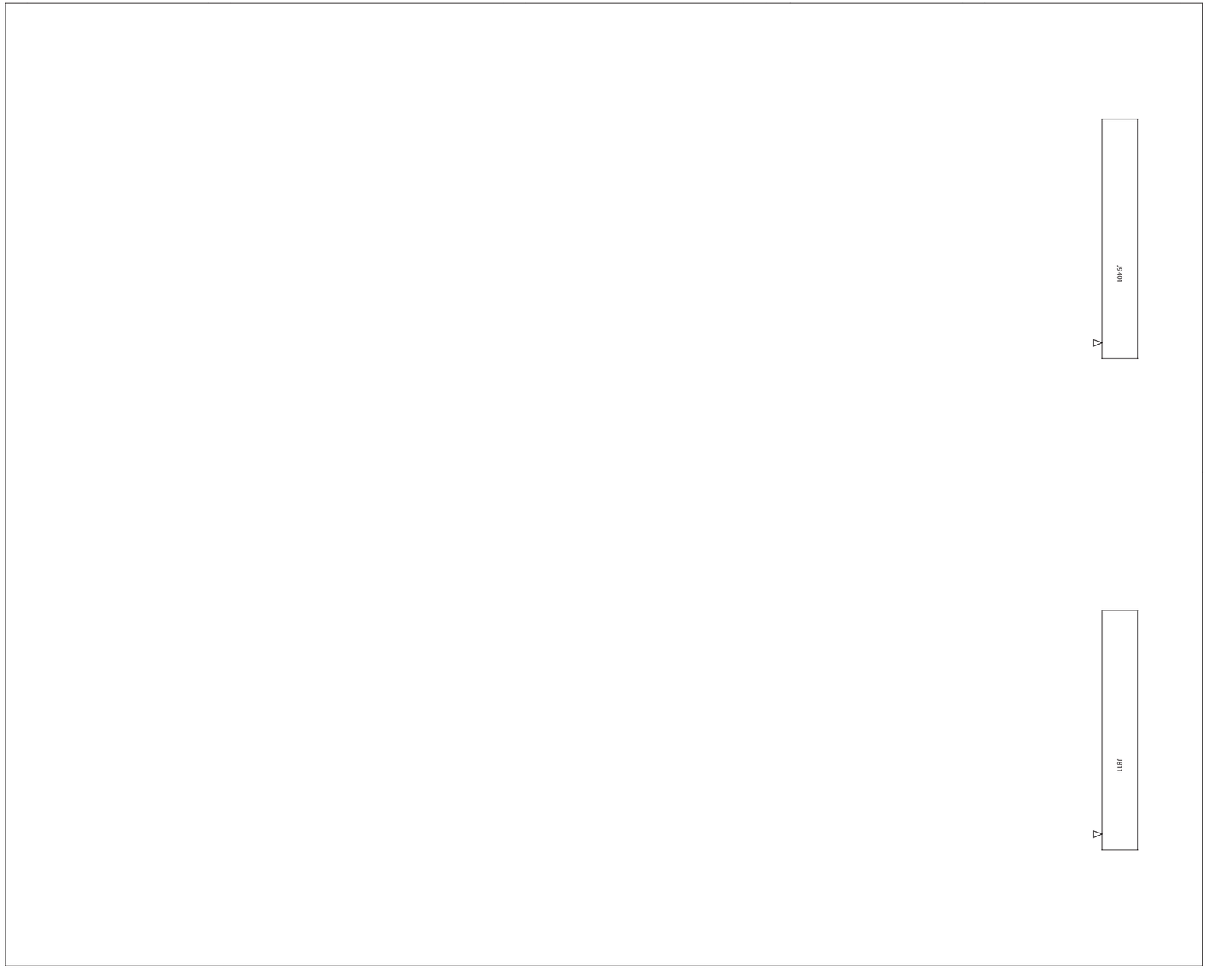


Figure 7-8 B4AOHigh Performance Analog Output (bottom) Rev 0

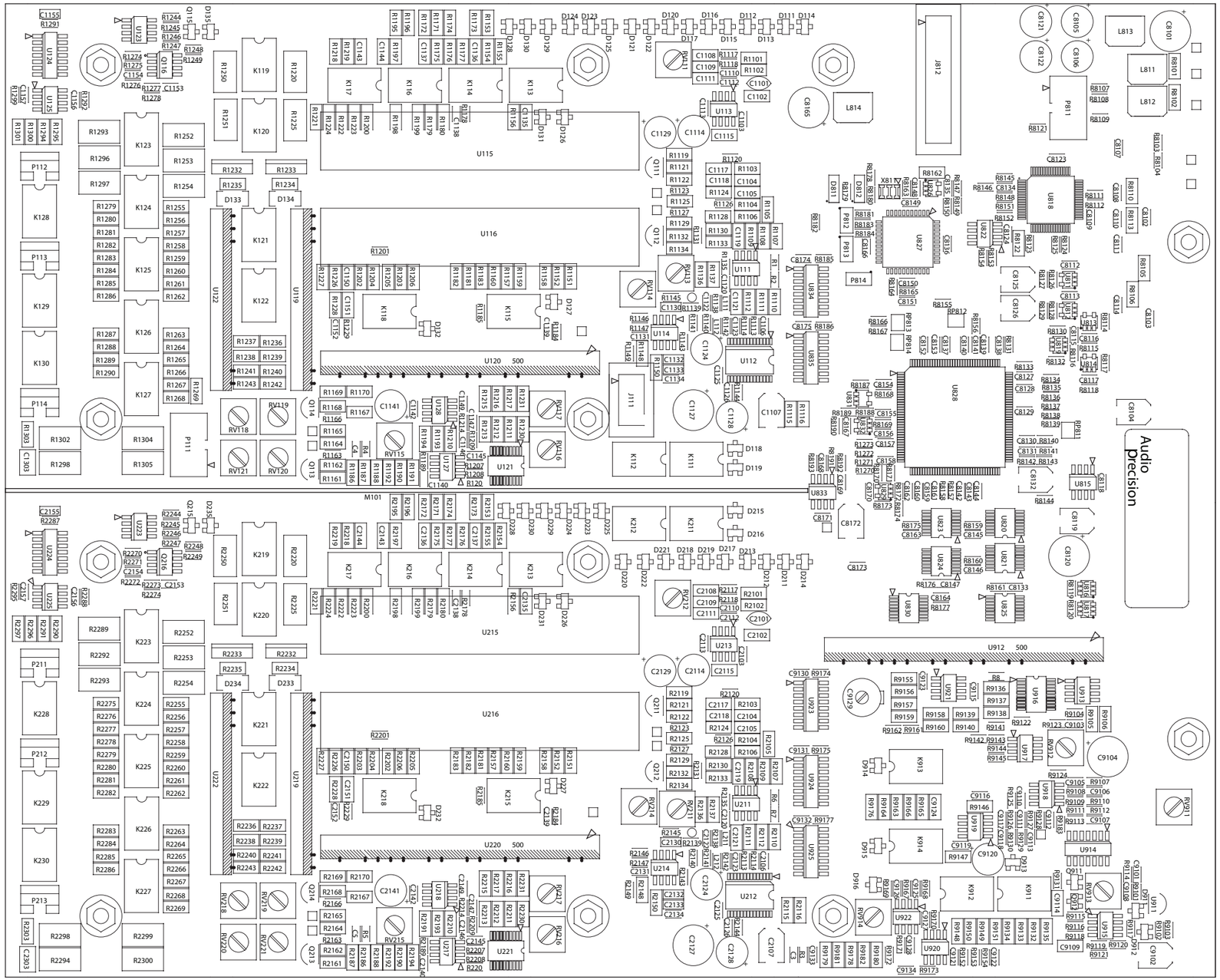


Figure 7-9 B4AOHigh Performance Analog Output (top) Rev 1

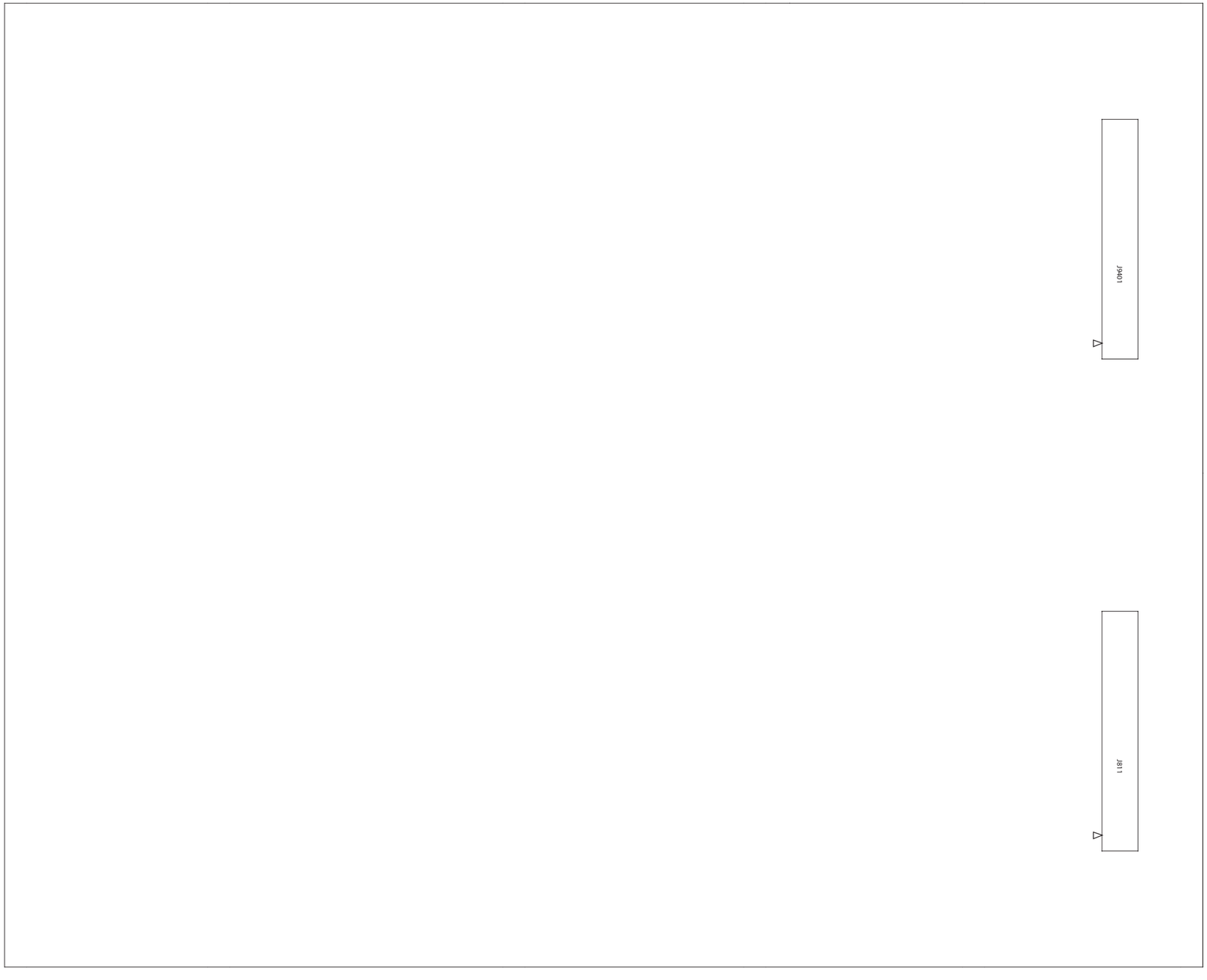


Figure 7-10 B4AOHigh Performance Analog Output (bottom) Rev 1

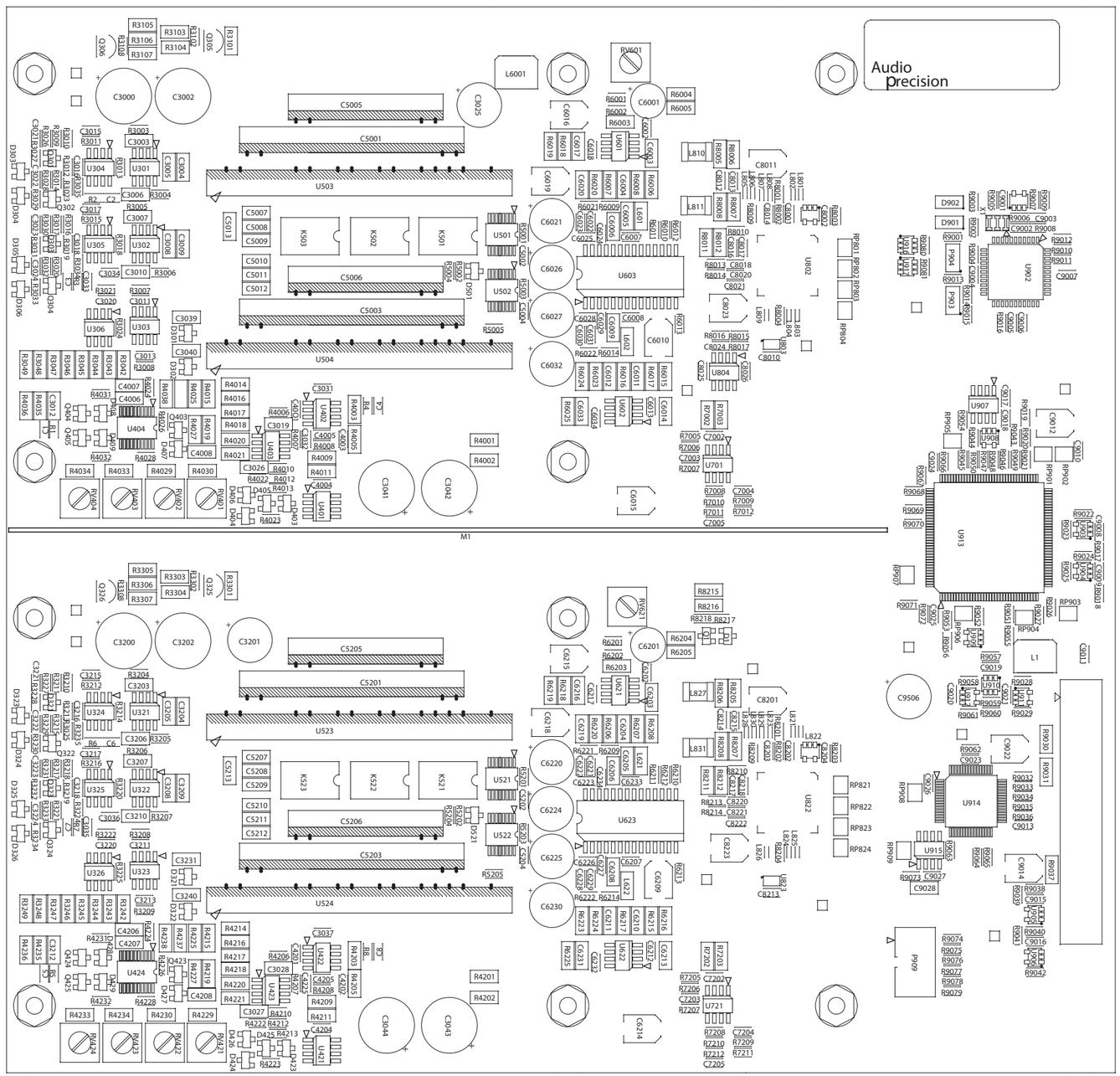


Figure 7-11 B4BR Band Reject (top) Rev 0

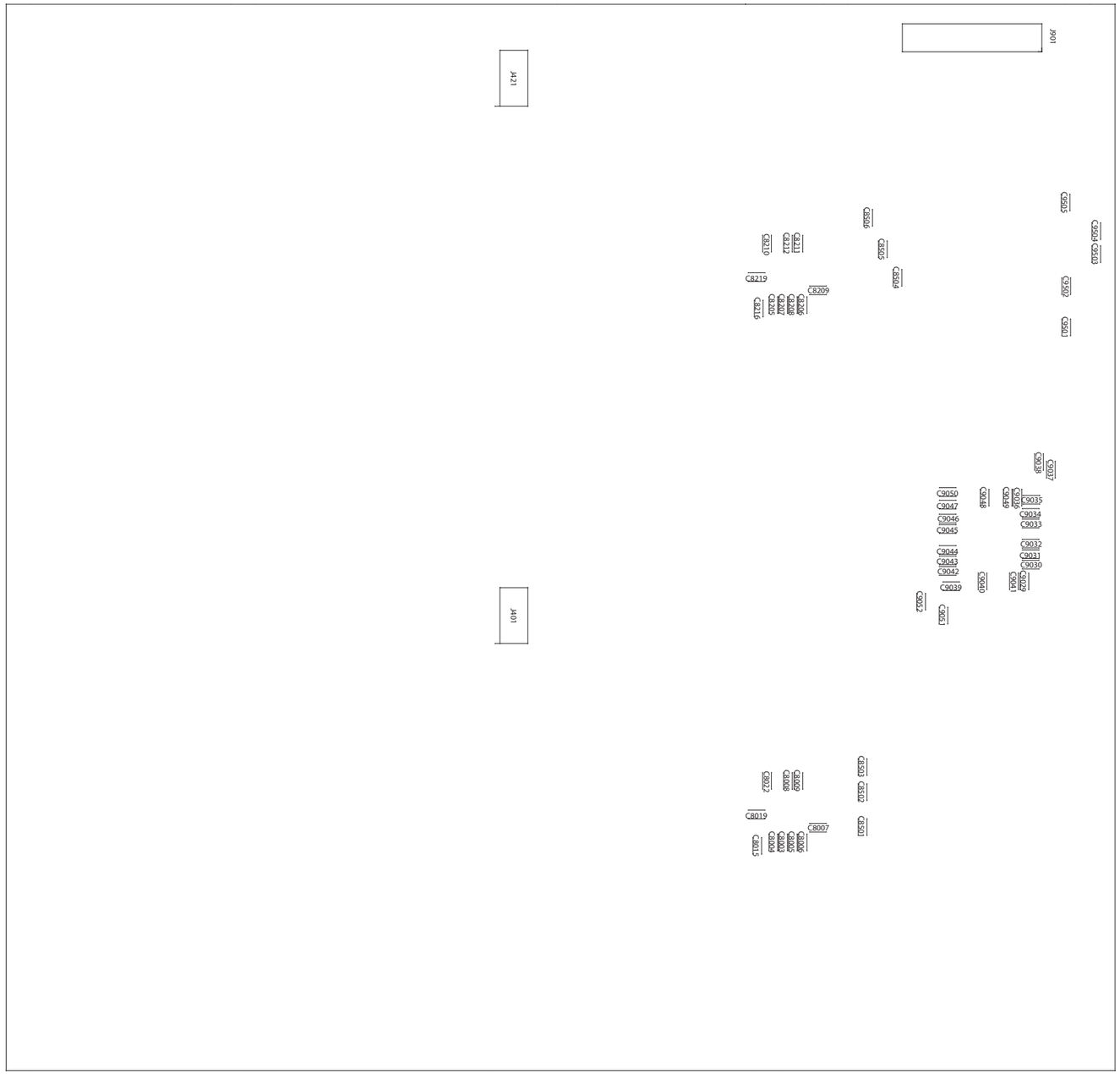


Figure 7-12 B4BR Band Reject (bottom) Rev 0

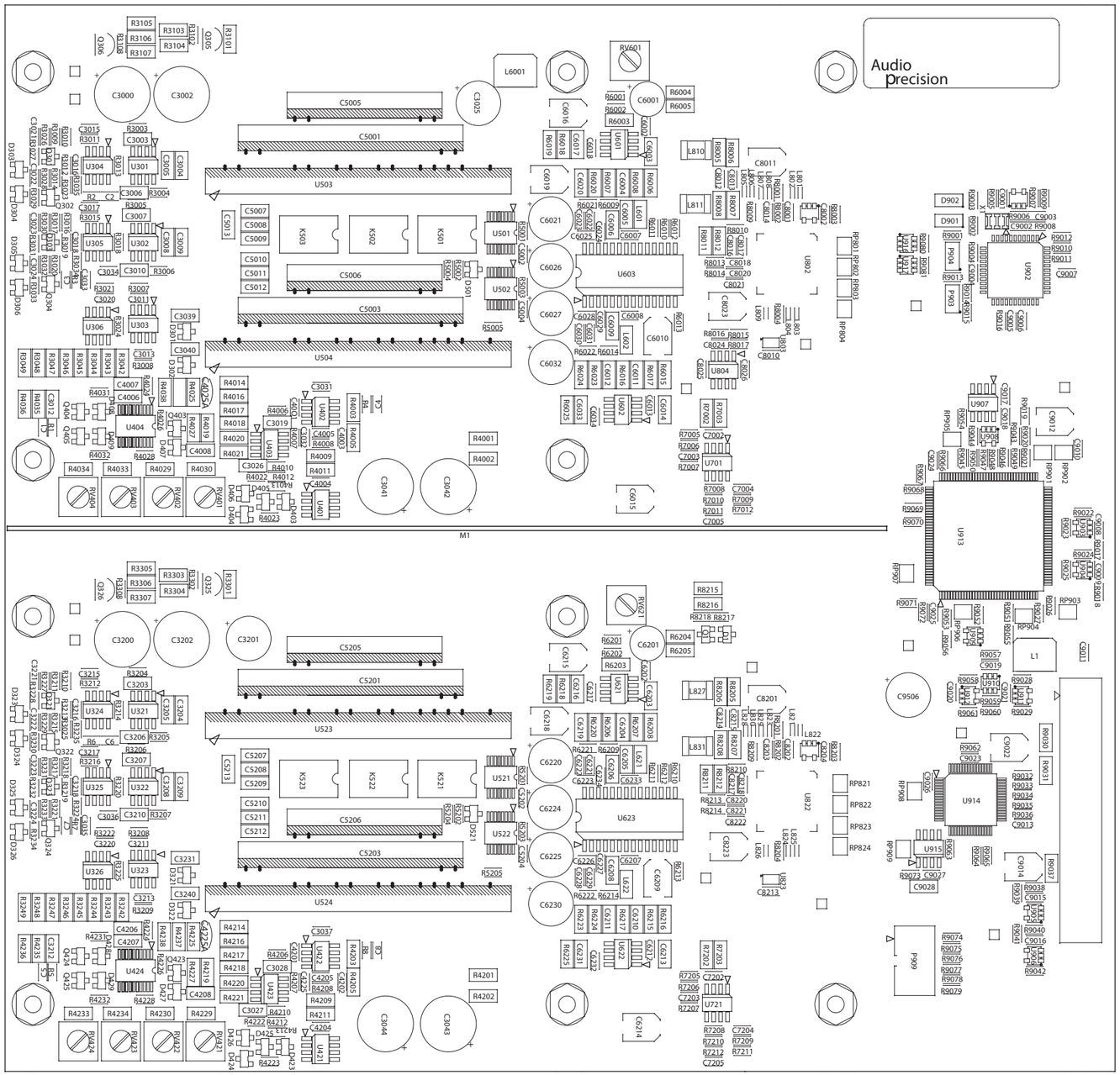


Figure 7-13 B4BR Band Reject (top) Rev 1

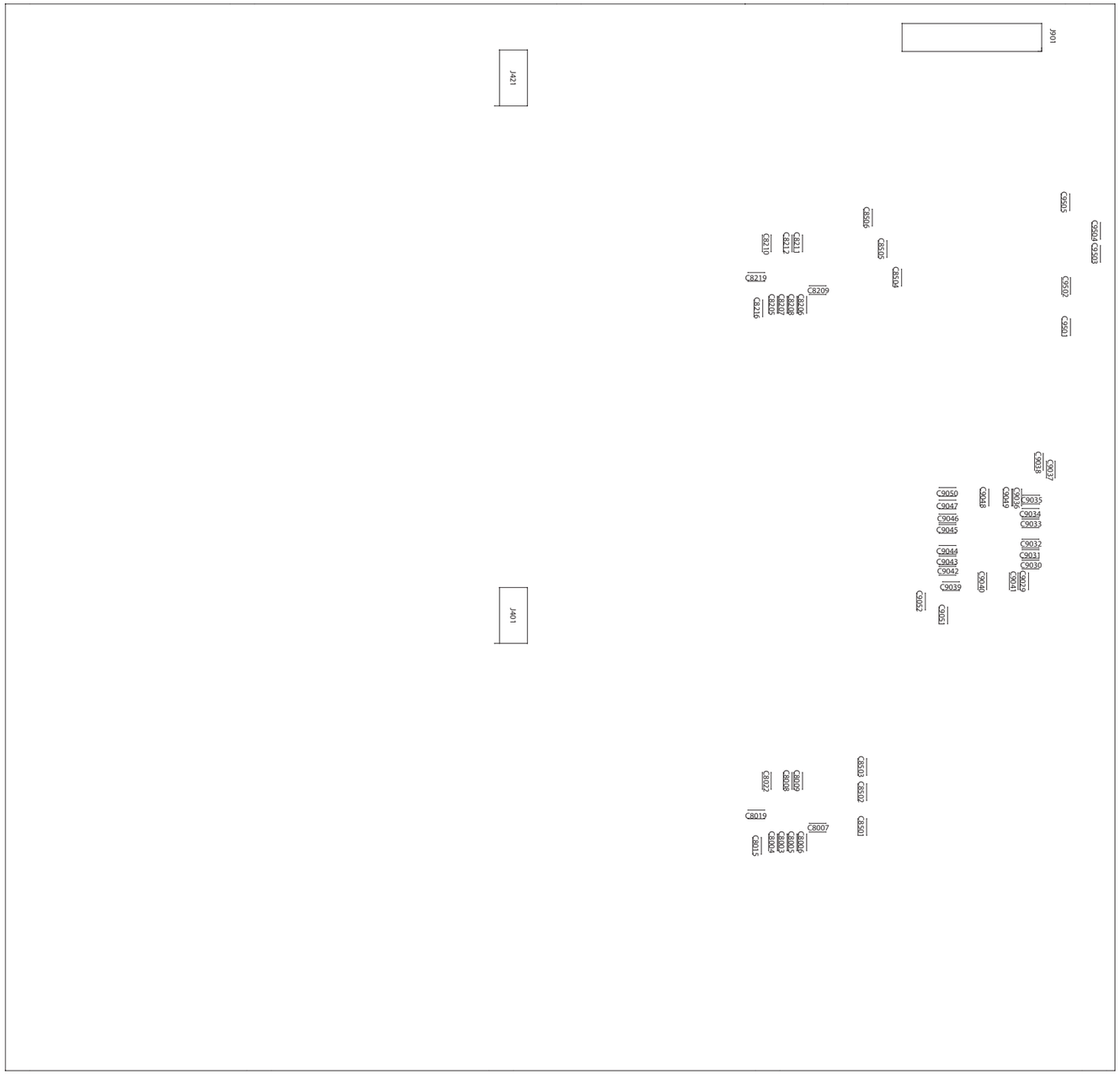


Figure 7-14 B4BR Band Reject (bottom) Rev 1

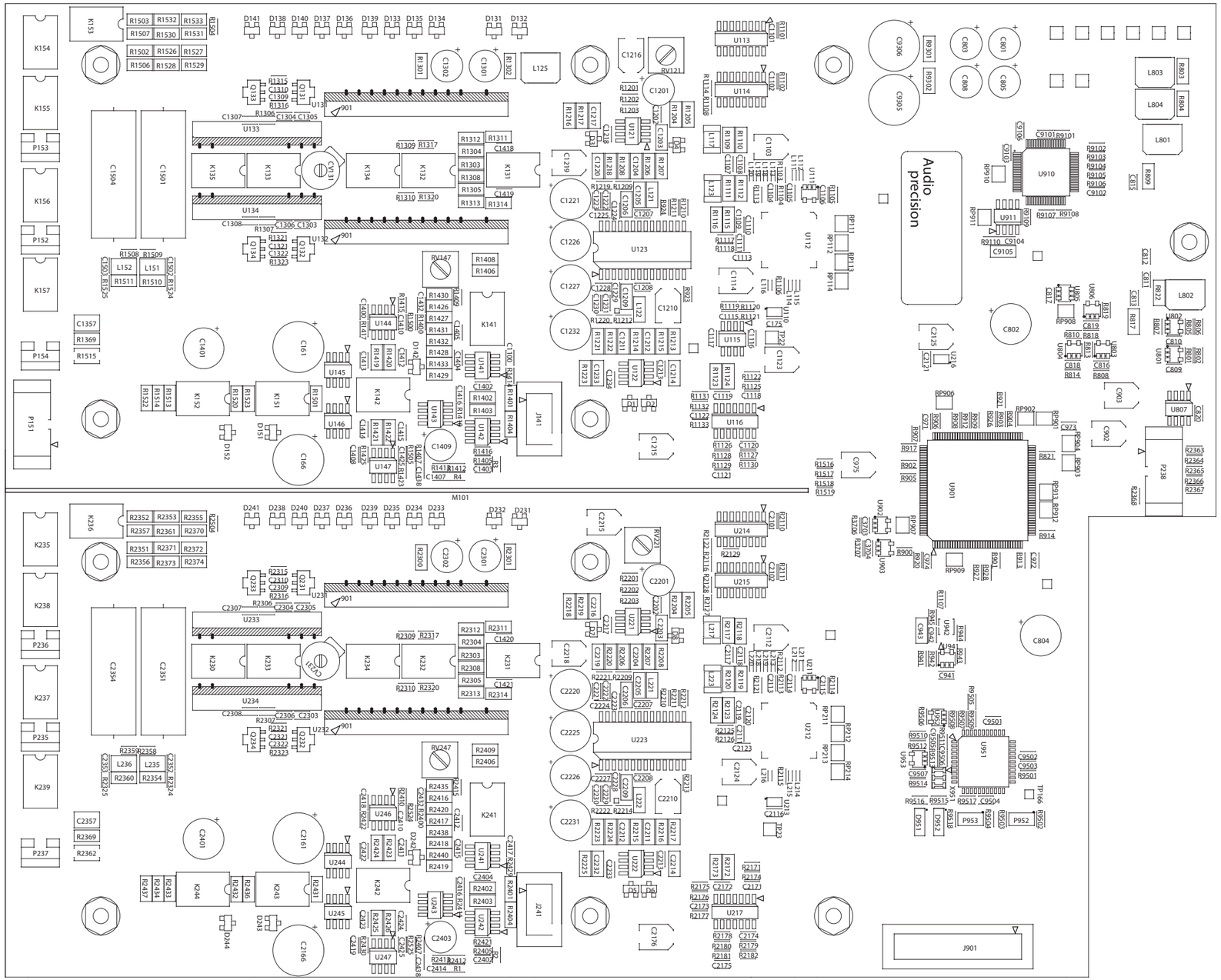


Figure 7-15 B4BR Band Reject (top) Rev 2

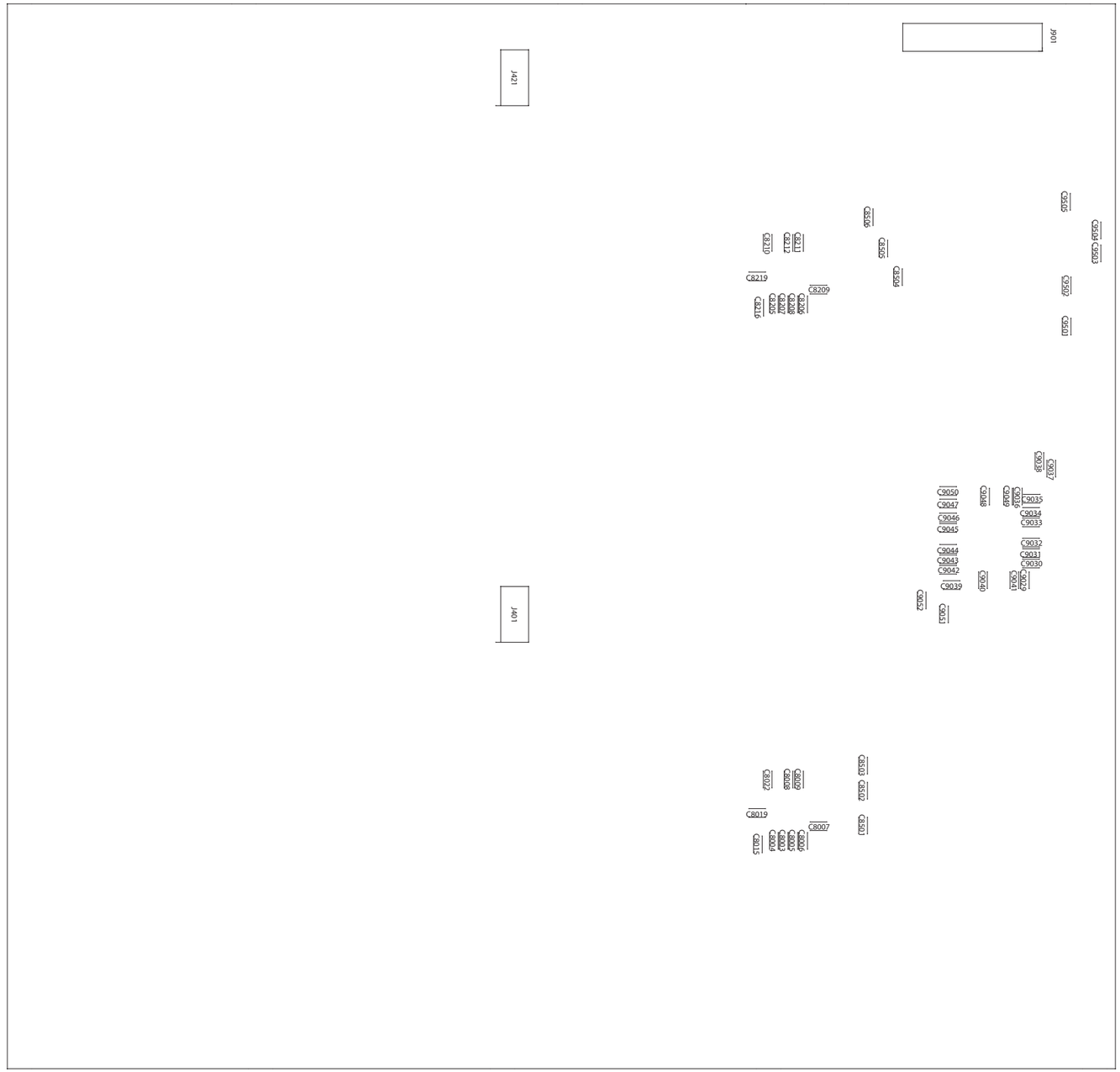


Figure 7-16 B4BR Band Reject (bottom) Rev 2

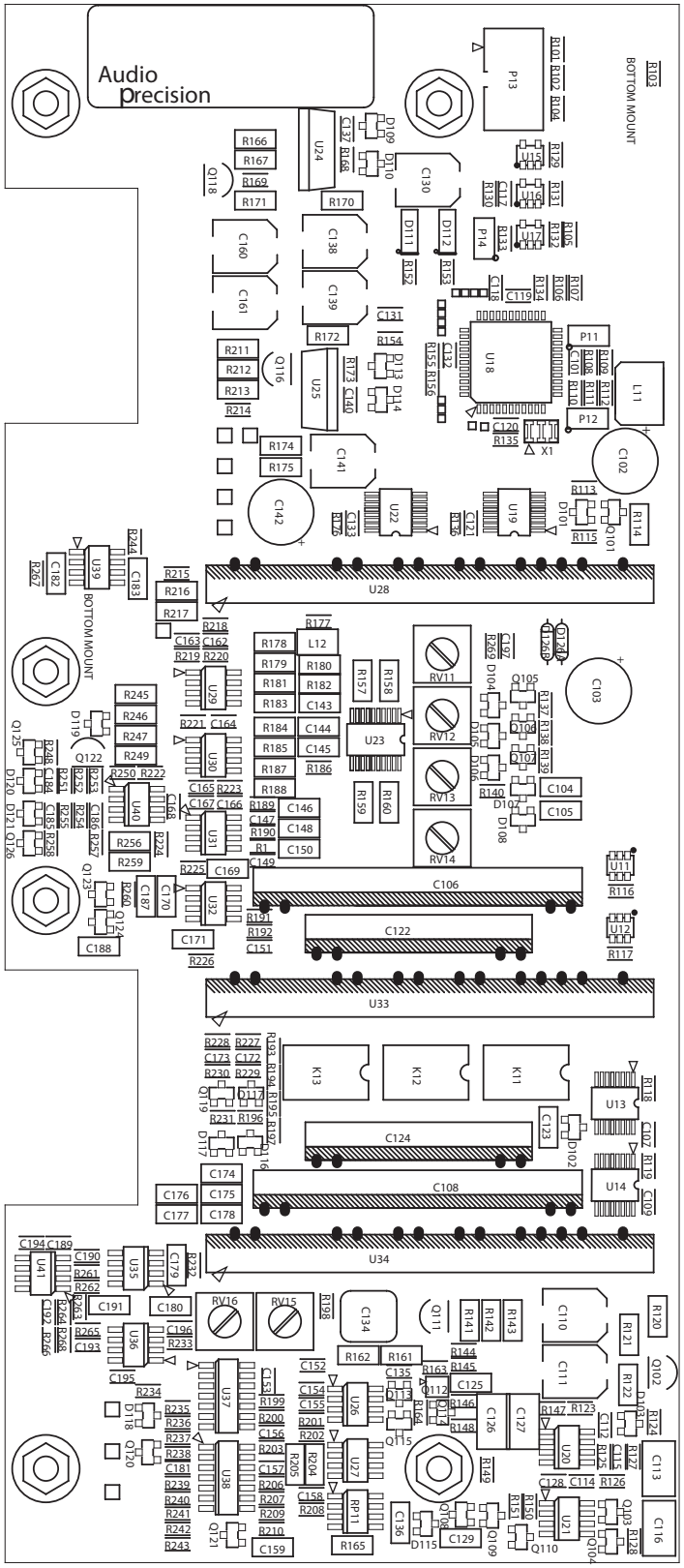


Figure 7-17 B4SG Signal Generator (top) Rev 0

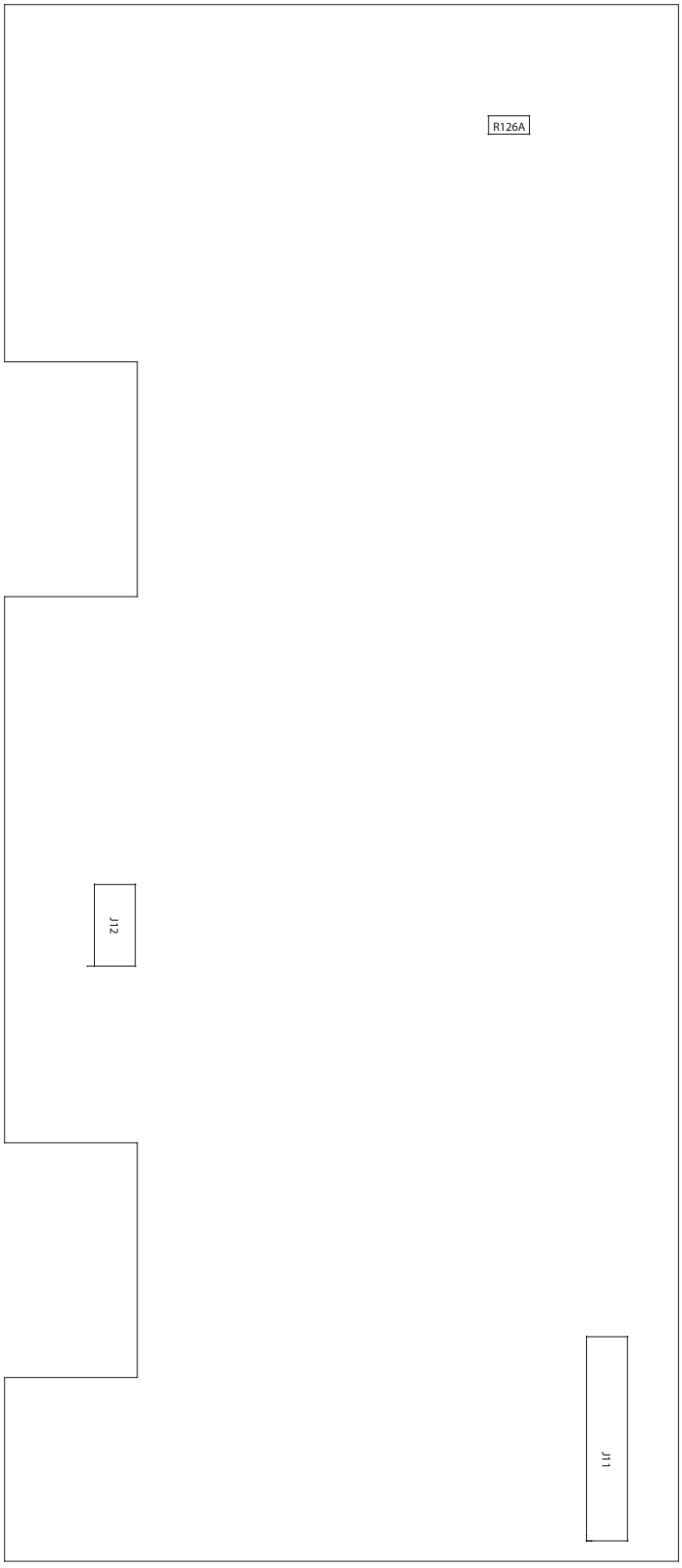


Figure 7-18 B4SG Signal Generator (bottom) Rev 0

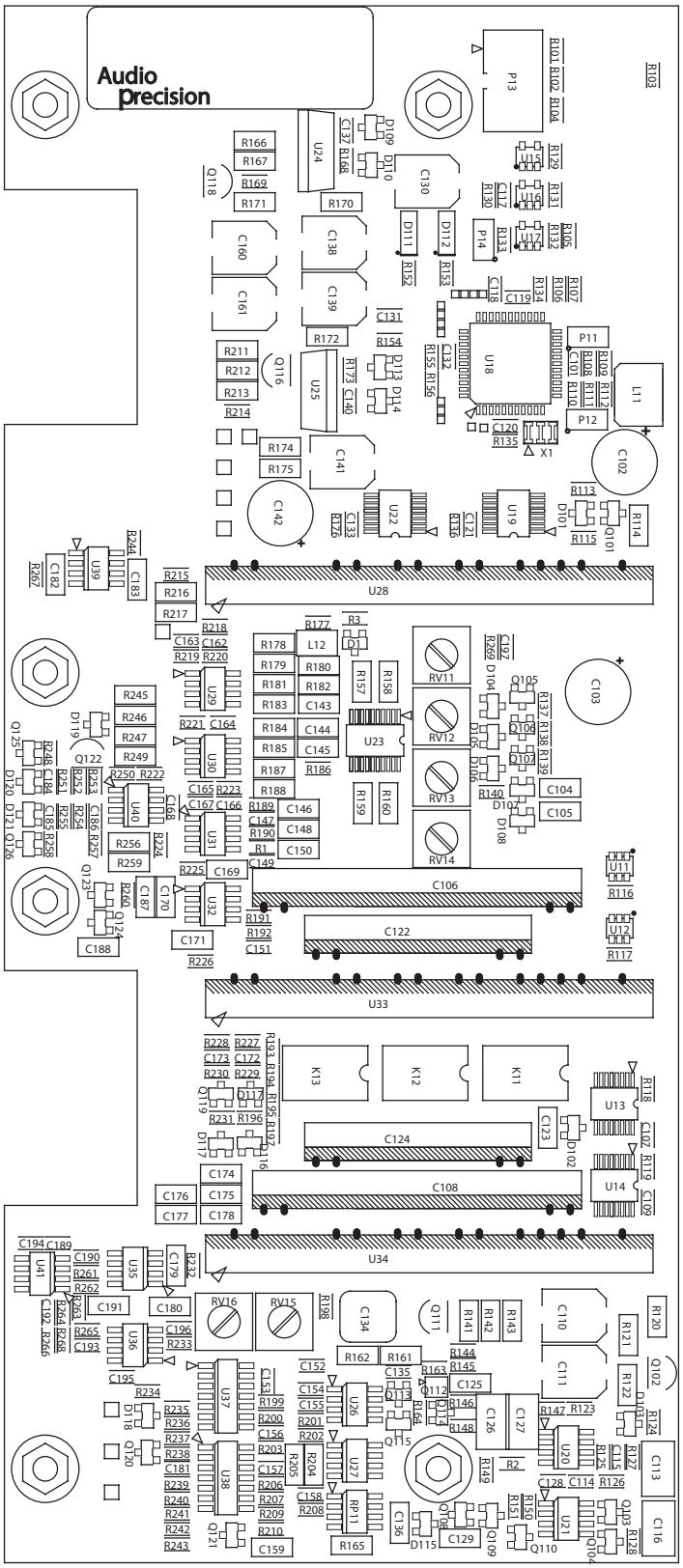


Figure 7-19 B4SG Signal Generator (top) Rev 1

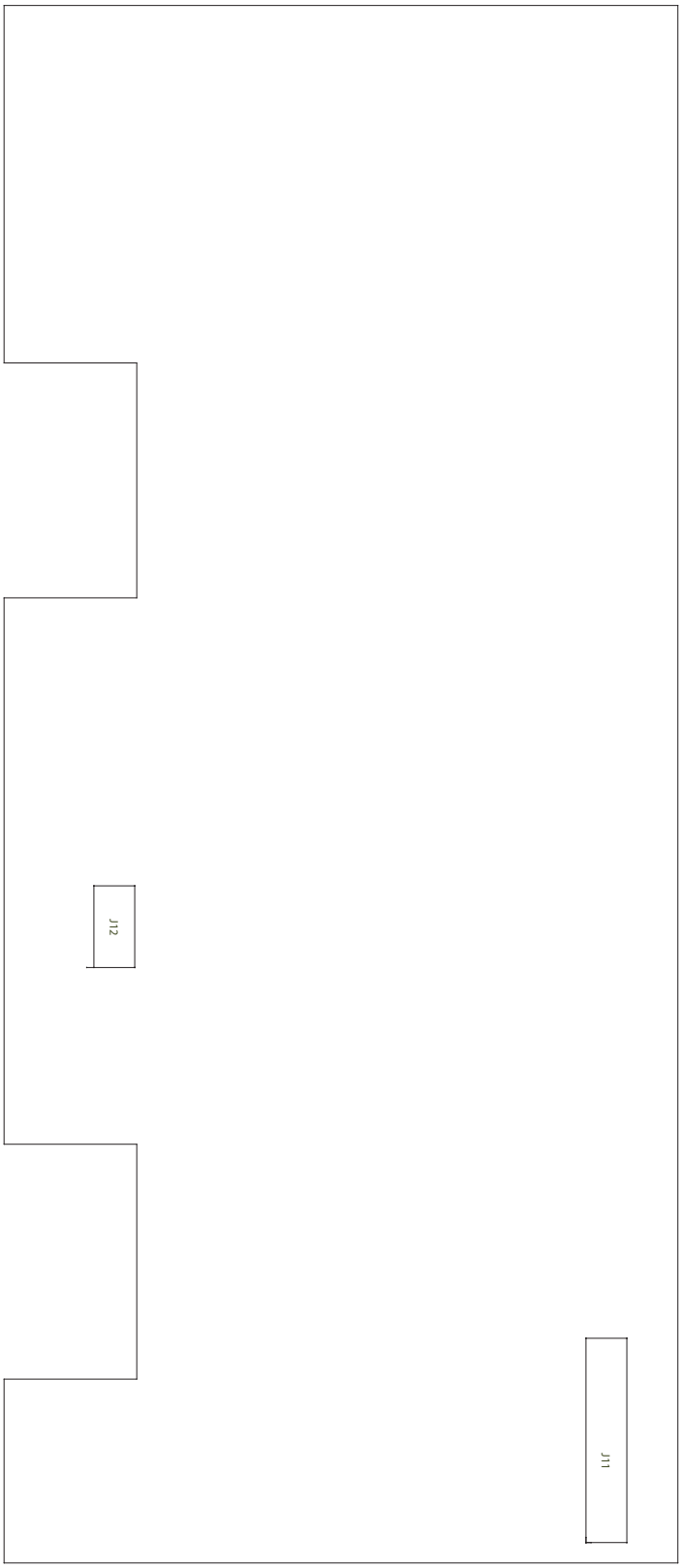


Figure 7-20 B4SG Signal Generator (bottom) Rev 1

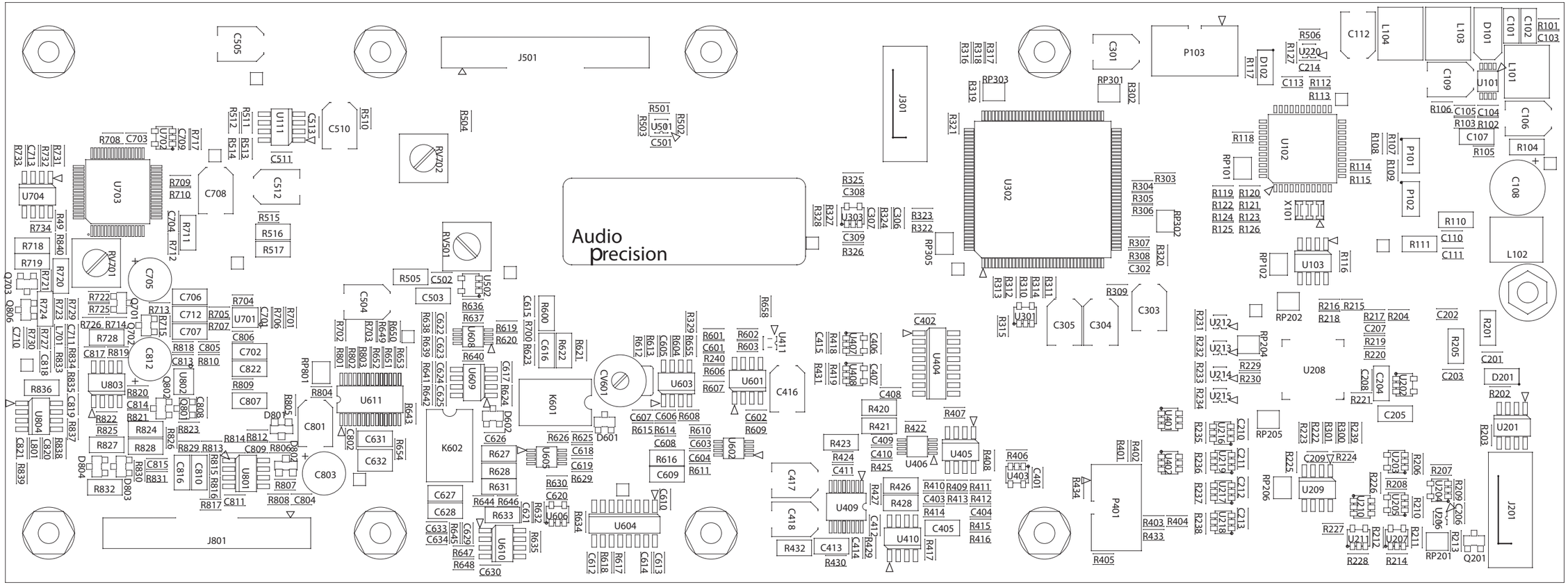


Figure 7-21 BADI Advanced Digital I/O (top) Rev 0

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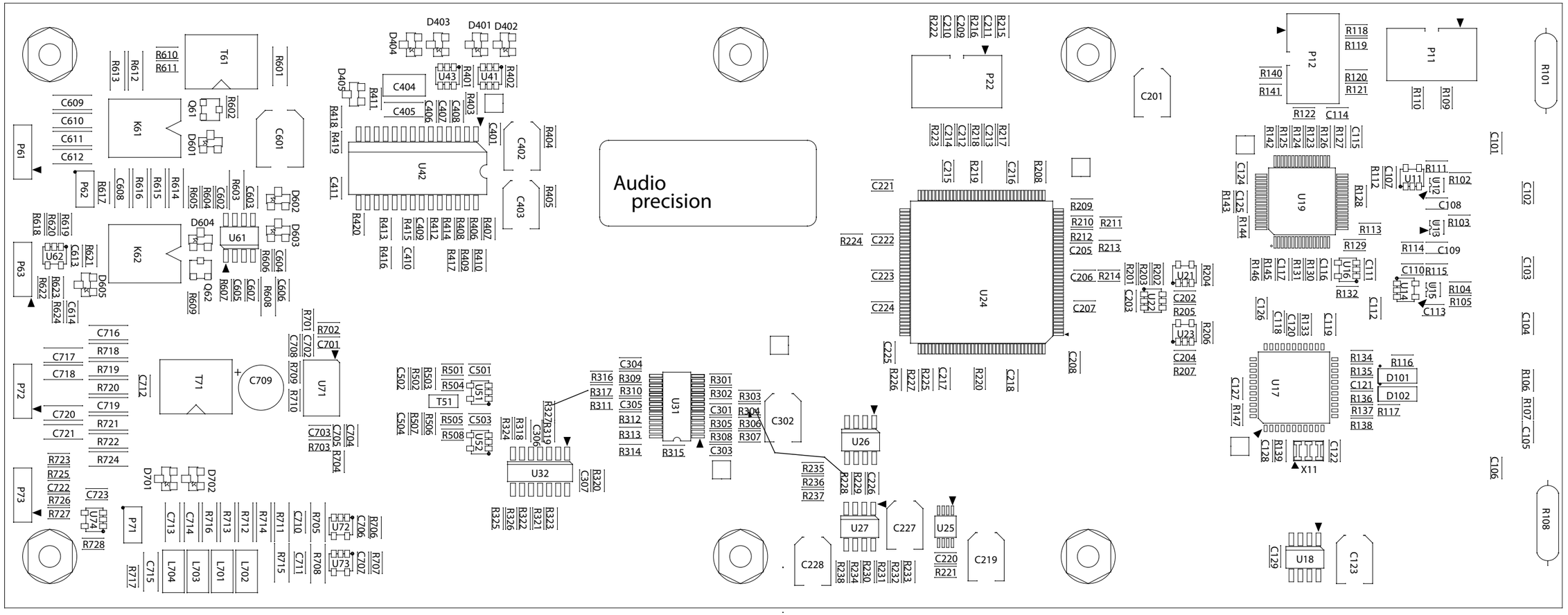

Figure 7-22 BAES Digital I/O Main Module w/XLR (top) Rev 0

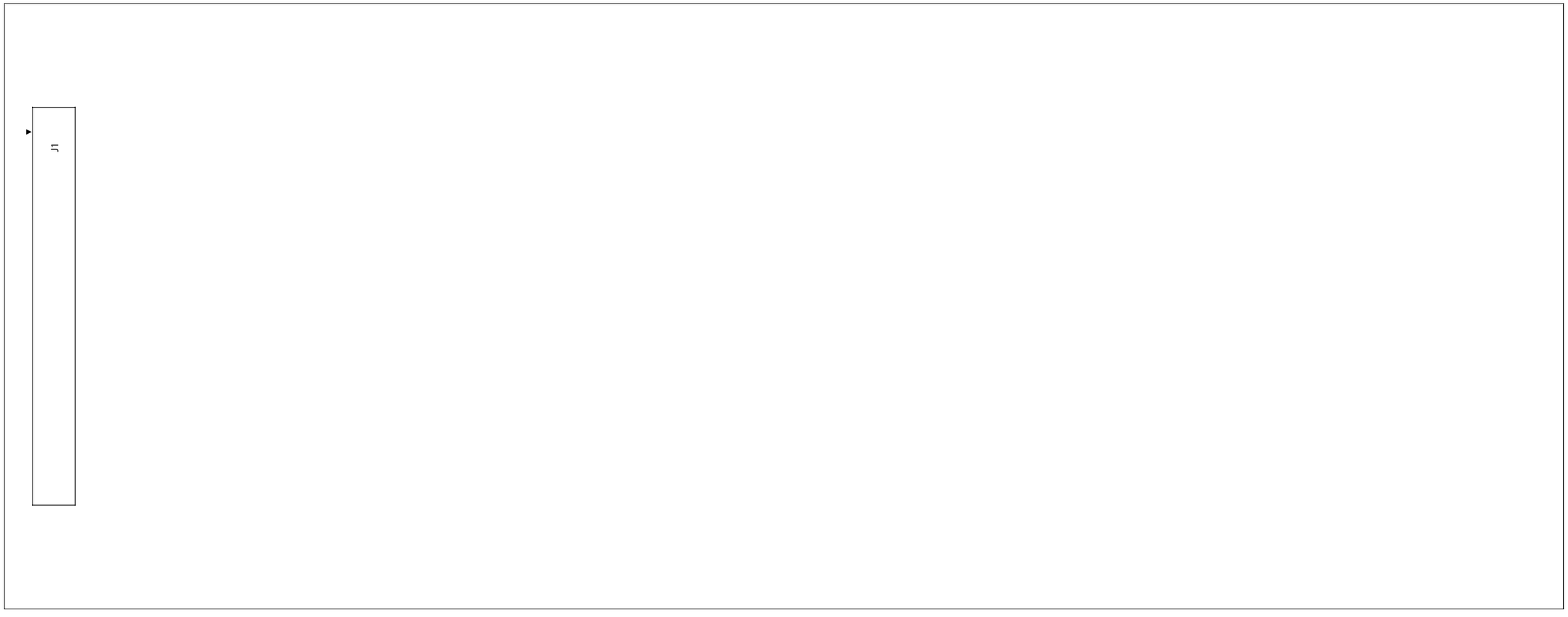

Figure 7-23 BAES Digital I/O Main Module w/XLR (bottom) Rev 0

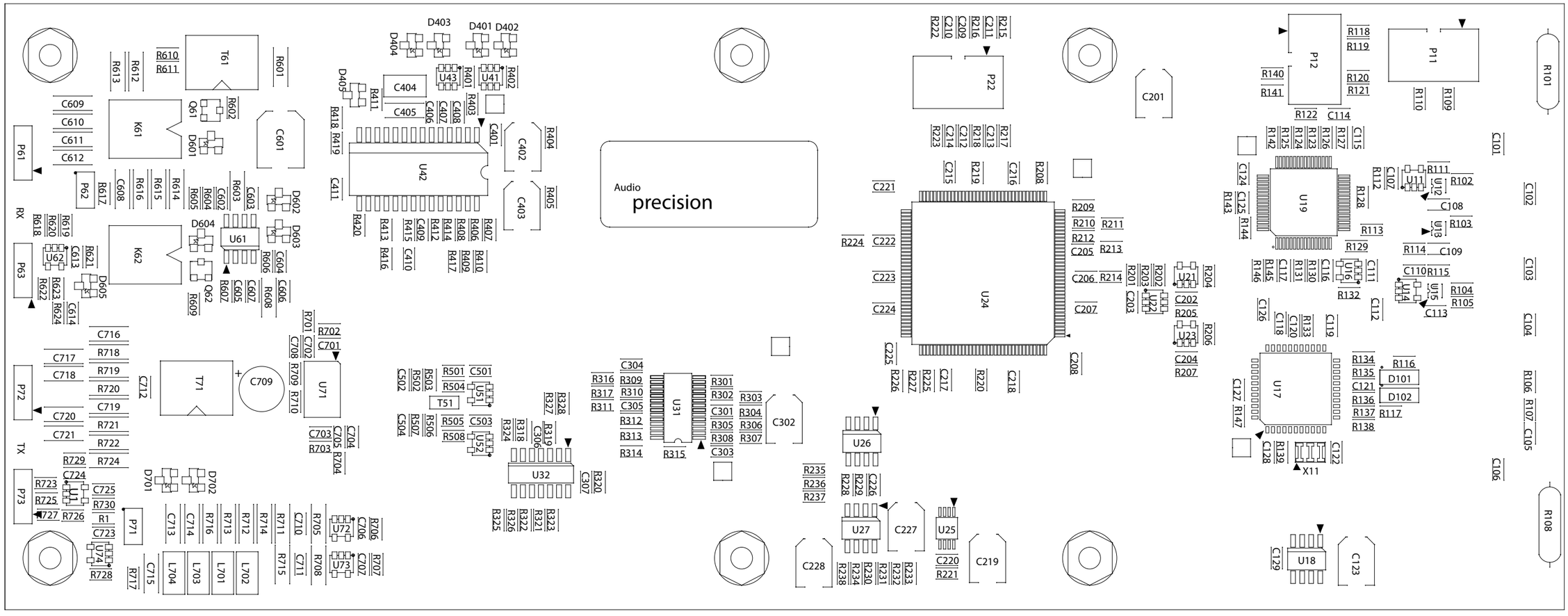

Figure 7-24 BAES Digital I/O Main Module w/XLR (top) Rev 1

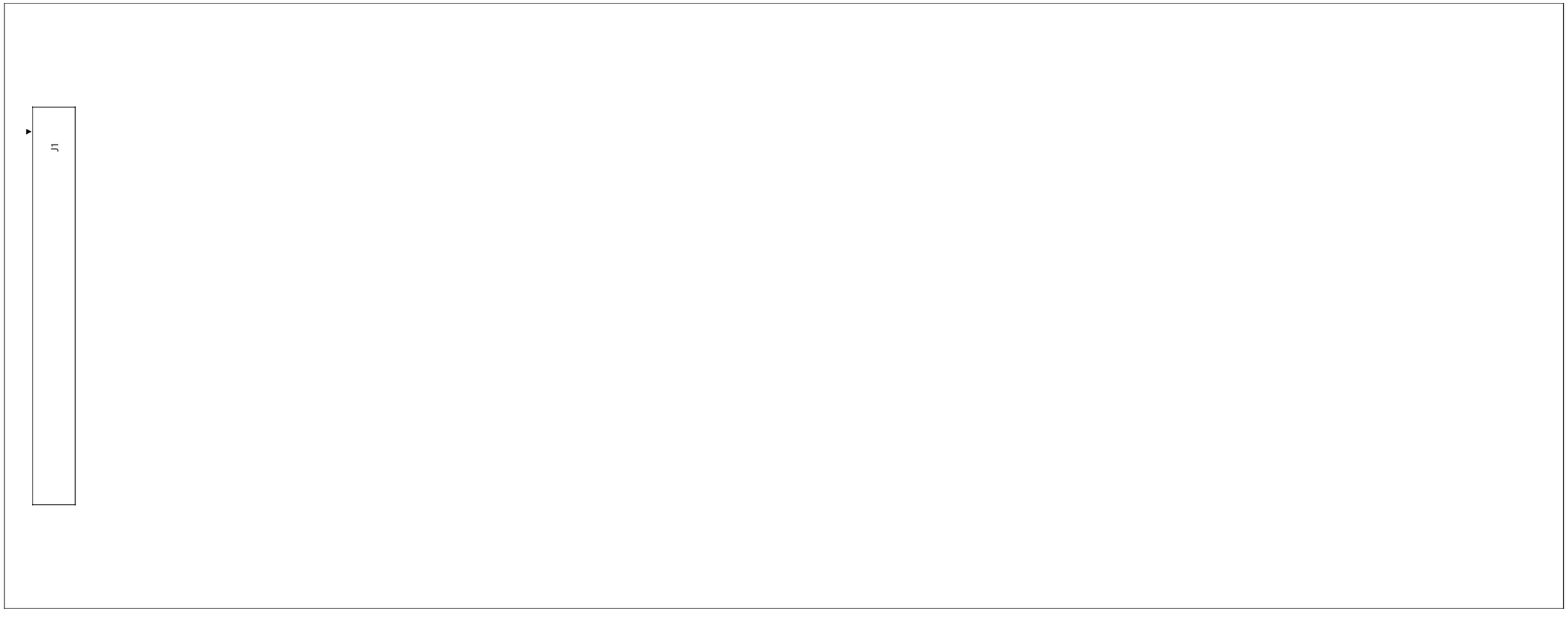

Figure 7-25 BAES Digital I/O Main Module w/XLR (bottom) Rev 1

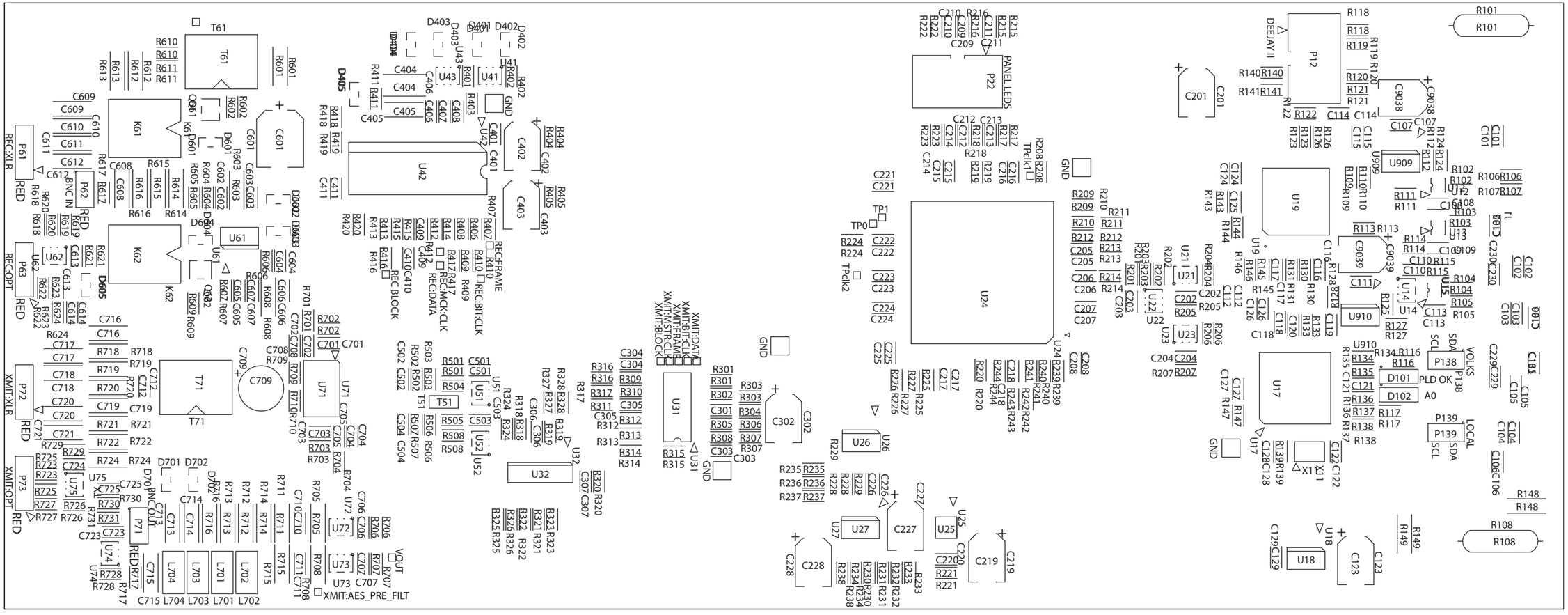

Figure 7-26 BAES Digital I/O Main Module w/XLR (top) Rev 2

Figure 7-27 BAES Digital I/O Main Module w/XLR (bottom) Rev 2

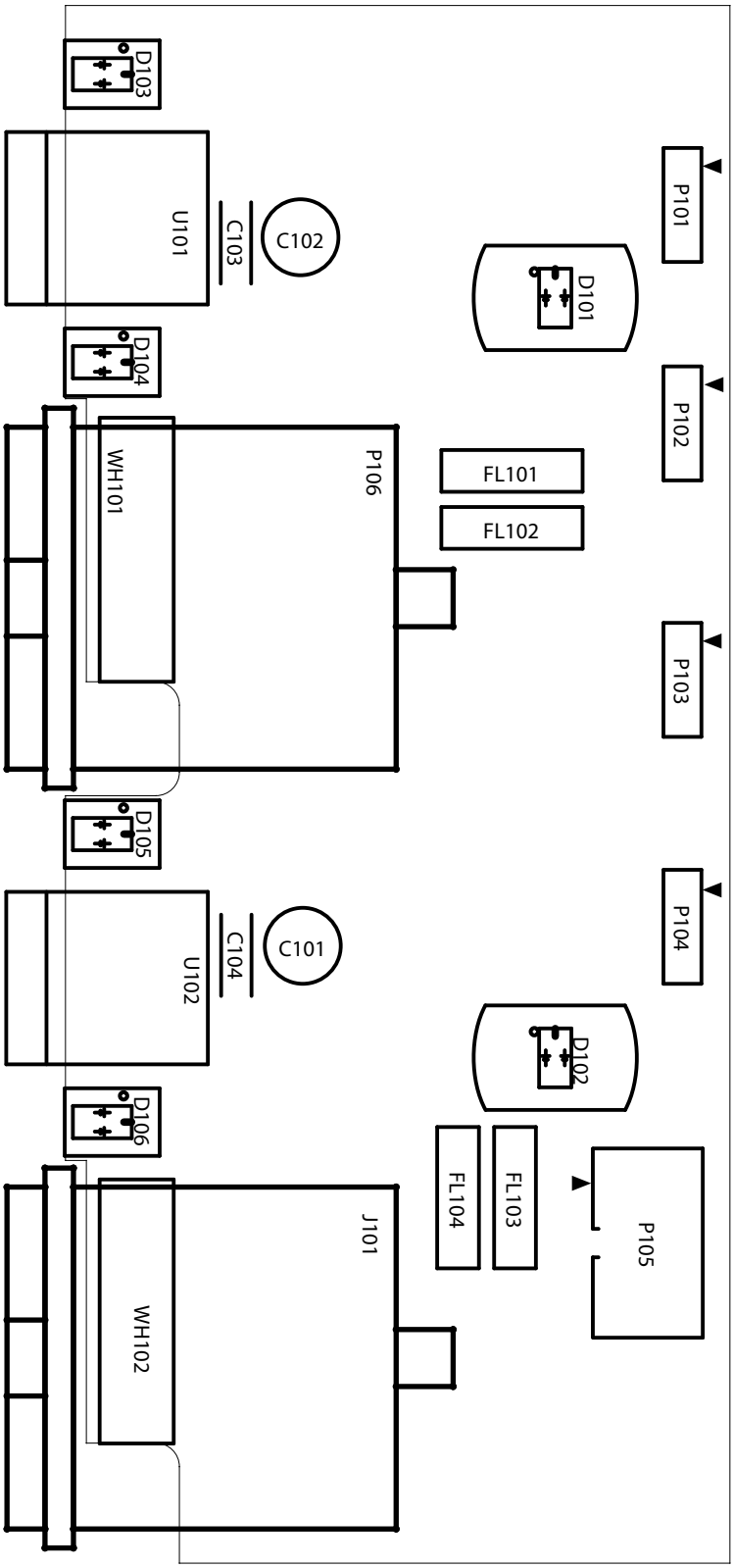

Figure 7-28 BAFP Digital I/O Front Panel Module Rev 0

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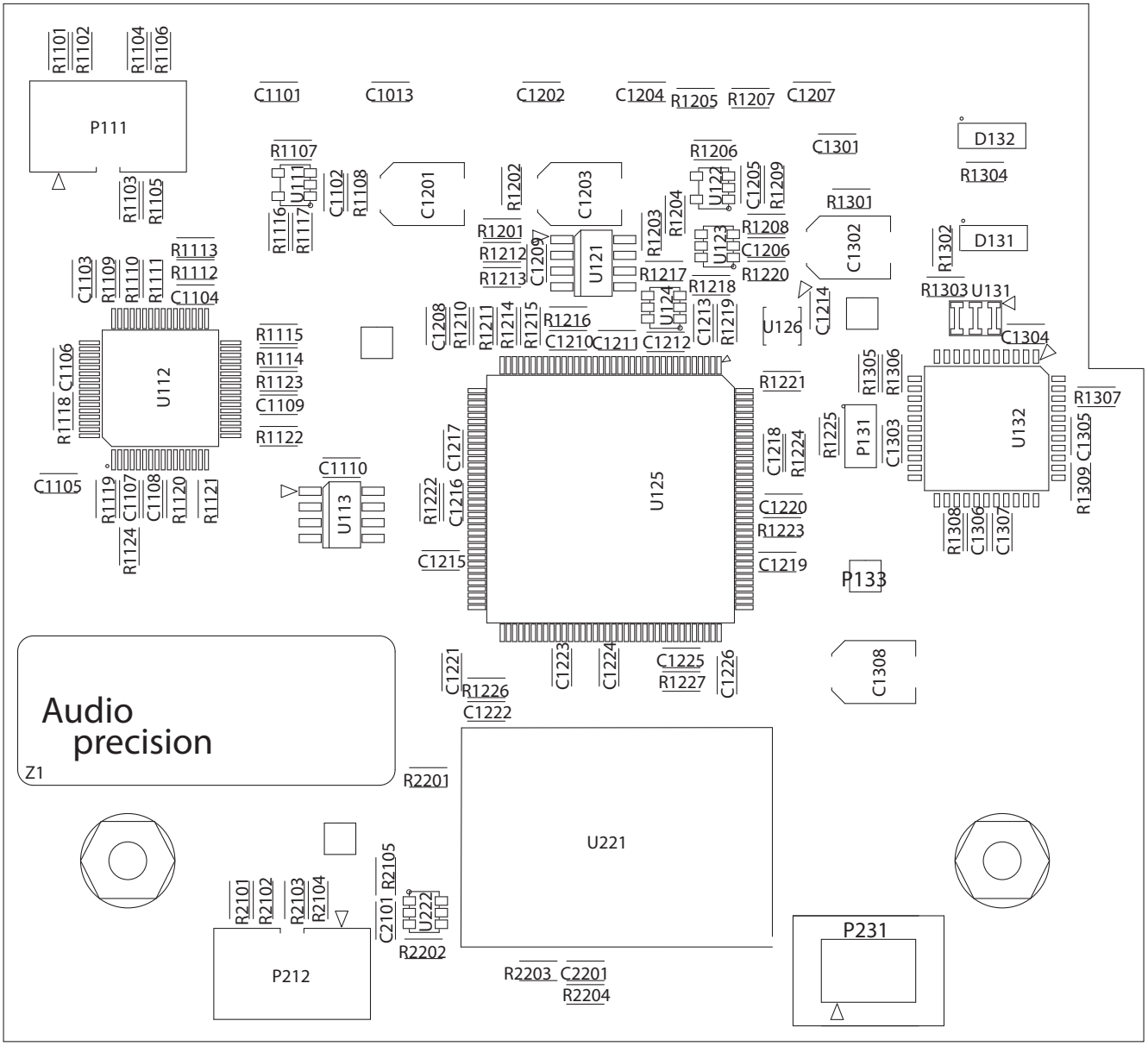

Figure 7-29 BAZL Bluetooth I/O (top) Rev 0

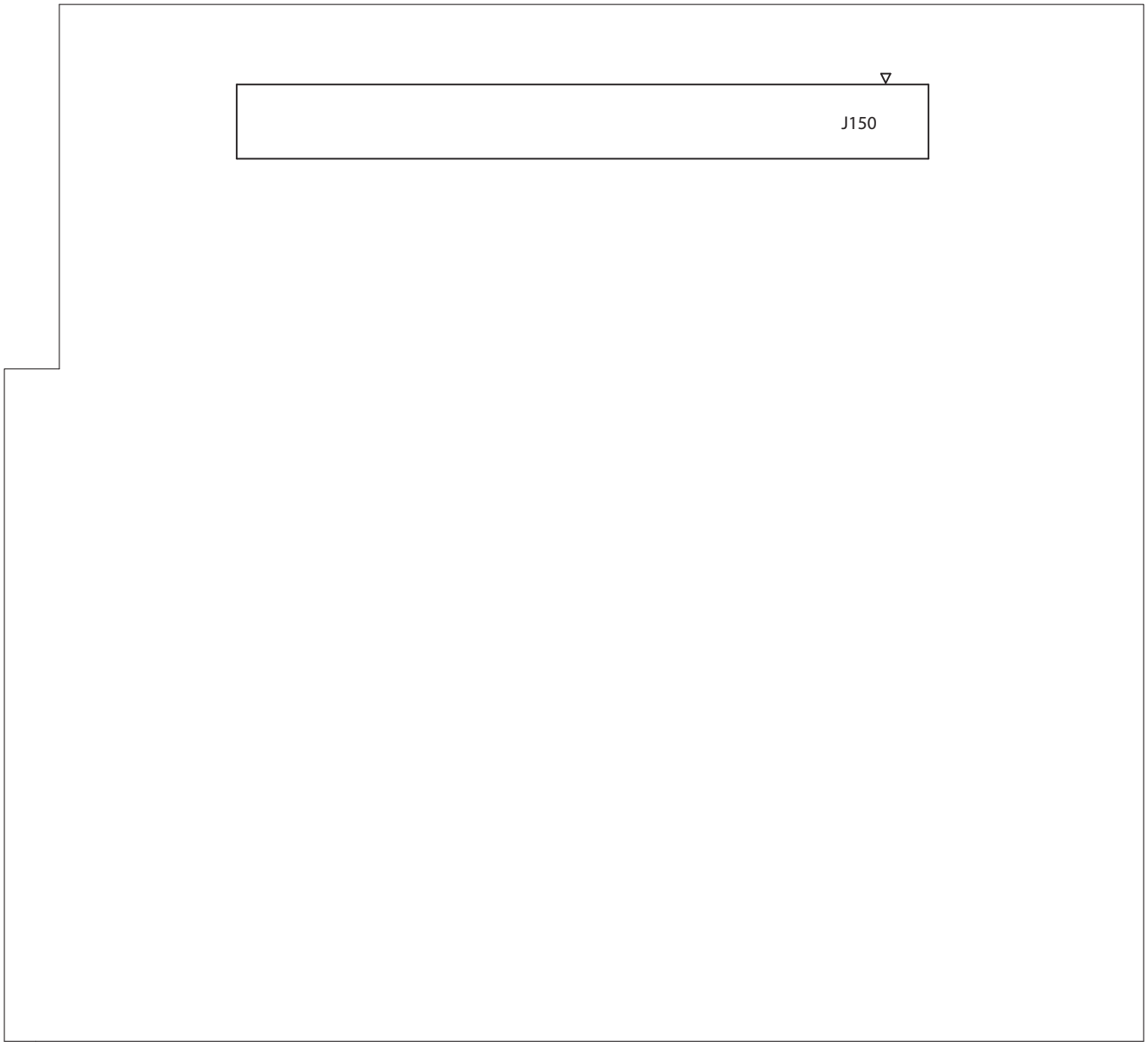

Figure 7-30 BAZL Bluetooth I/O (bottom) Rev 0

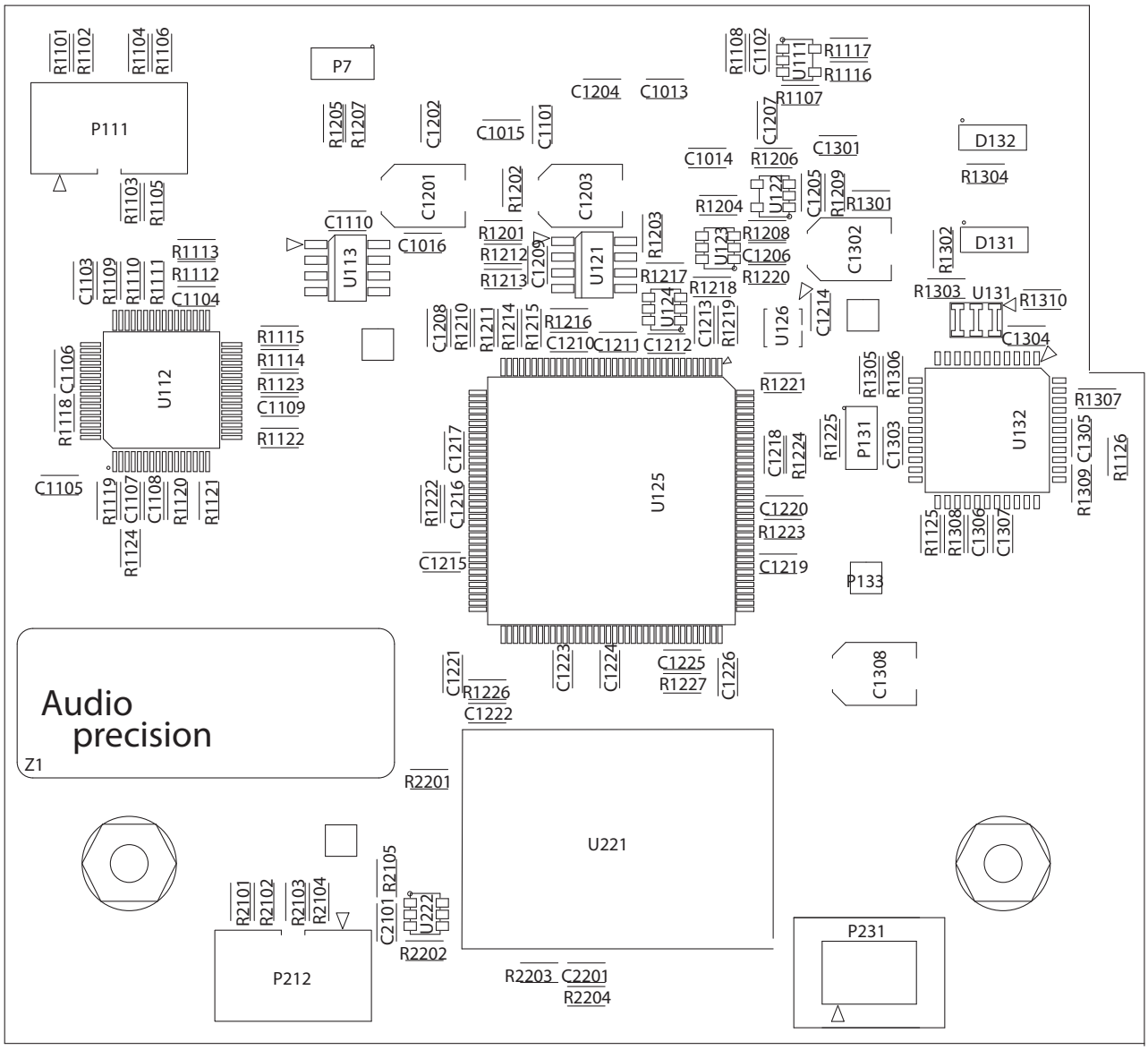

Figure 7-31 BAZL/BAZW Bluetooth I/O (top) Rev 1

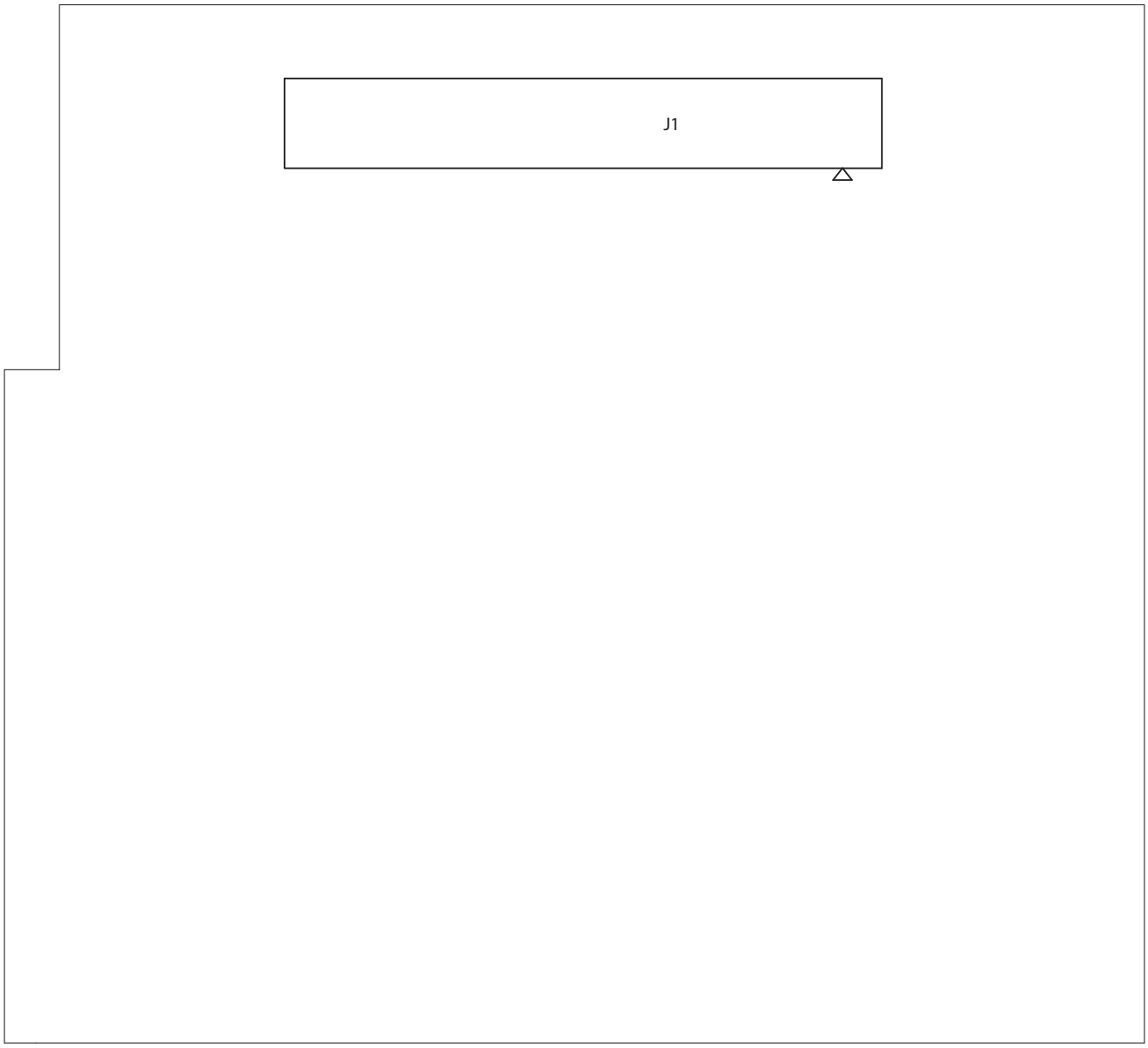

Figure 7-32 BAZL/BAZW Bluetooth I/O (bottom) Rev 1

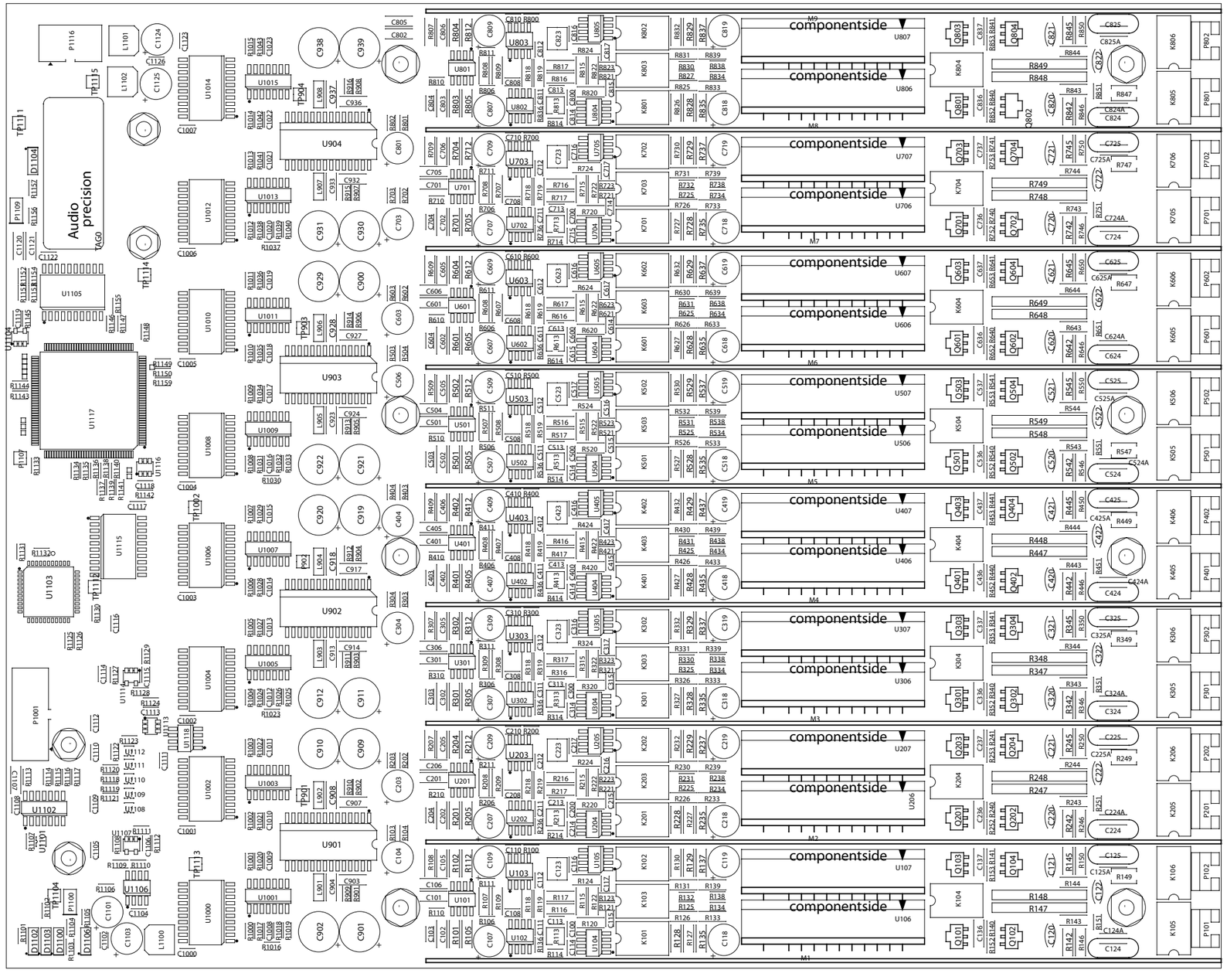

Figure 7-33 BCAS Analog Input Module (8-chan) (top) Rev 0

Figure 7-34 BCAS Analog Input Module (8-chan) (bottom) Rev 0

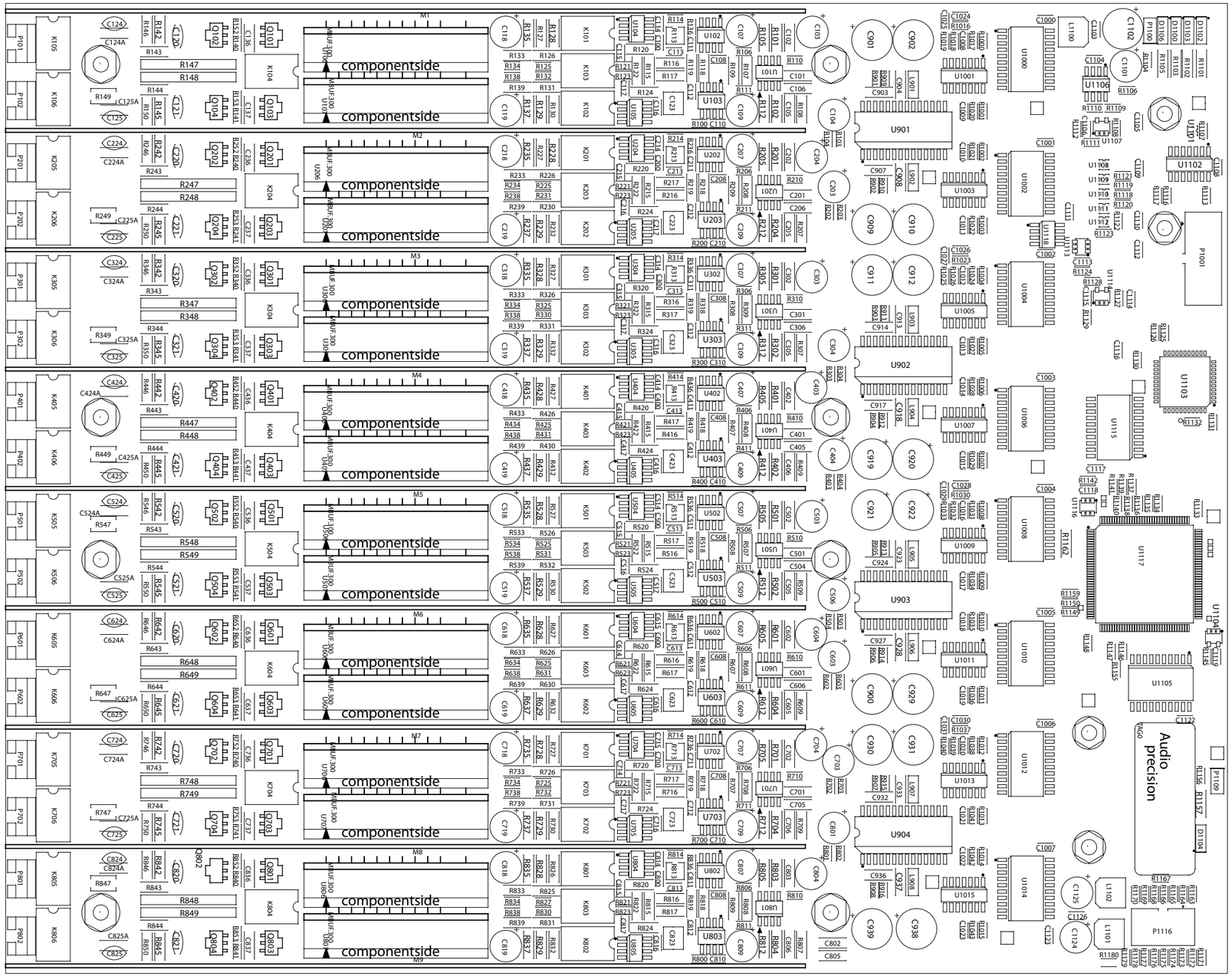
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Figure 7-35 BCAS Analog Input Module (8-chan) (top) Rev 1

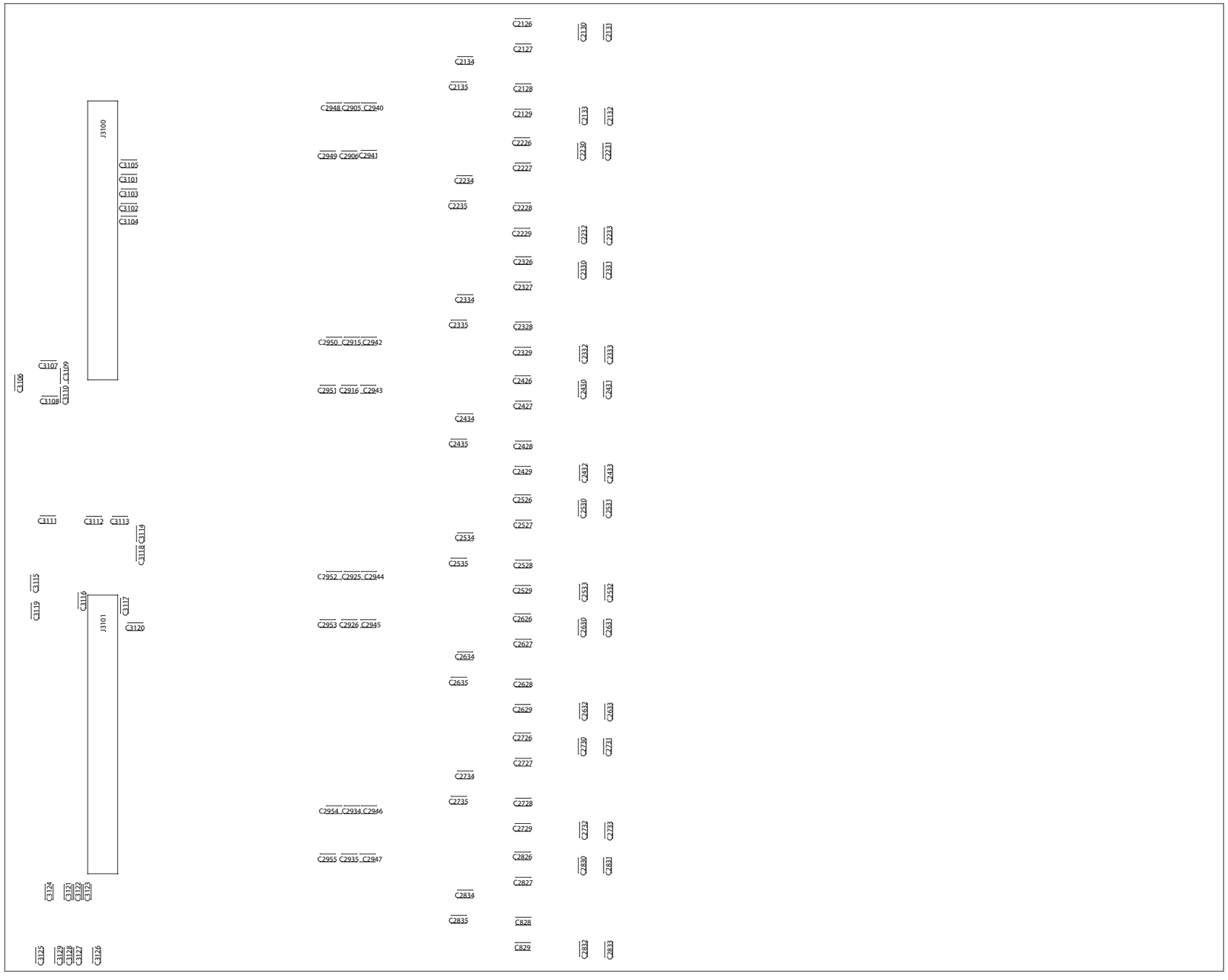
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Figure 7-36 BCAS Analog Input Module (8-chan) (bottom) Rev 1

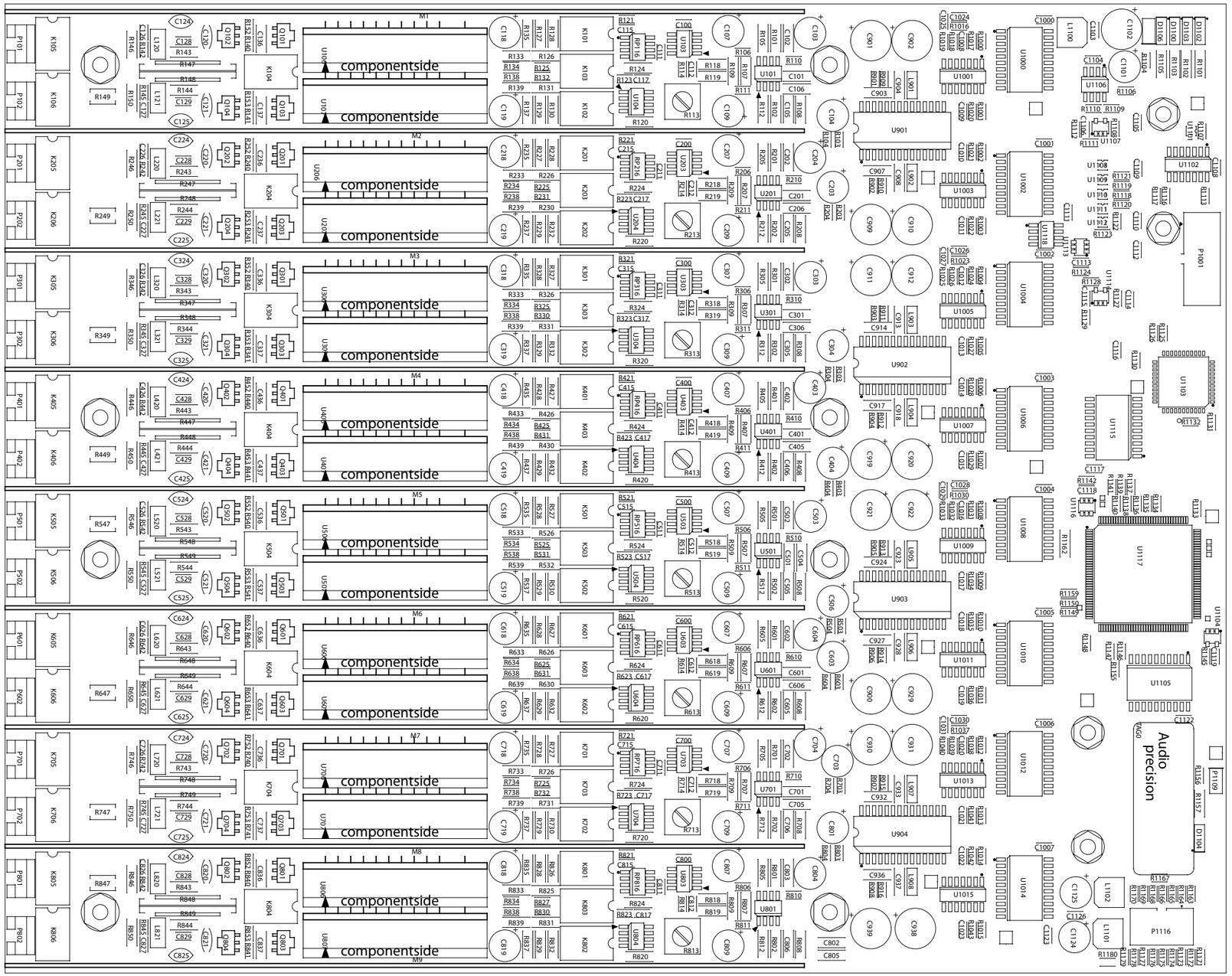

Figure 7-37 BCAS Analog Input Module (8-chan) (top) Rev 2

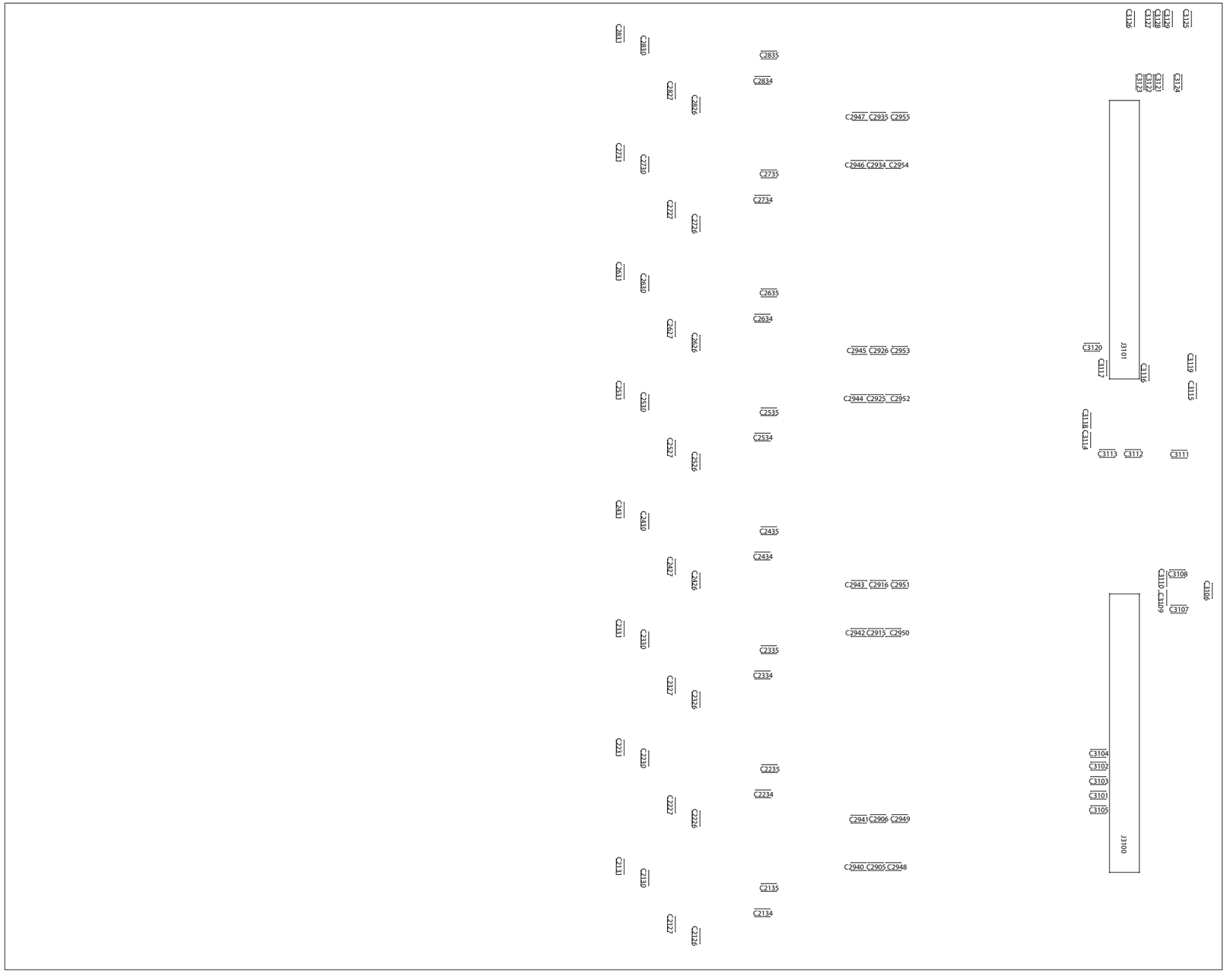

Figure 7-38 BCAS Analog Input Module (8-chan) (bottom) Rev 2

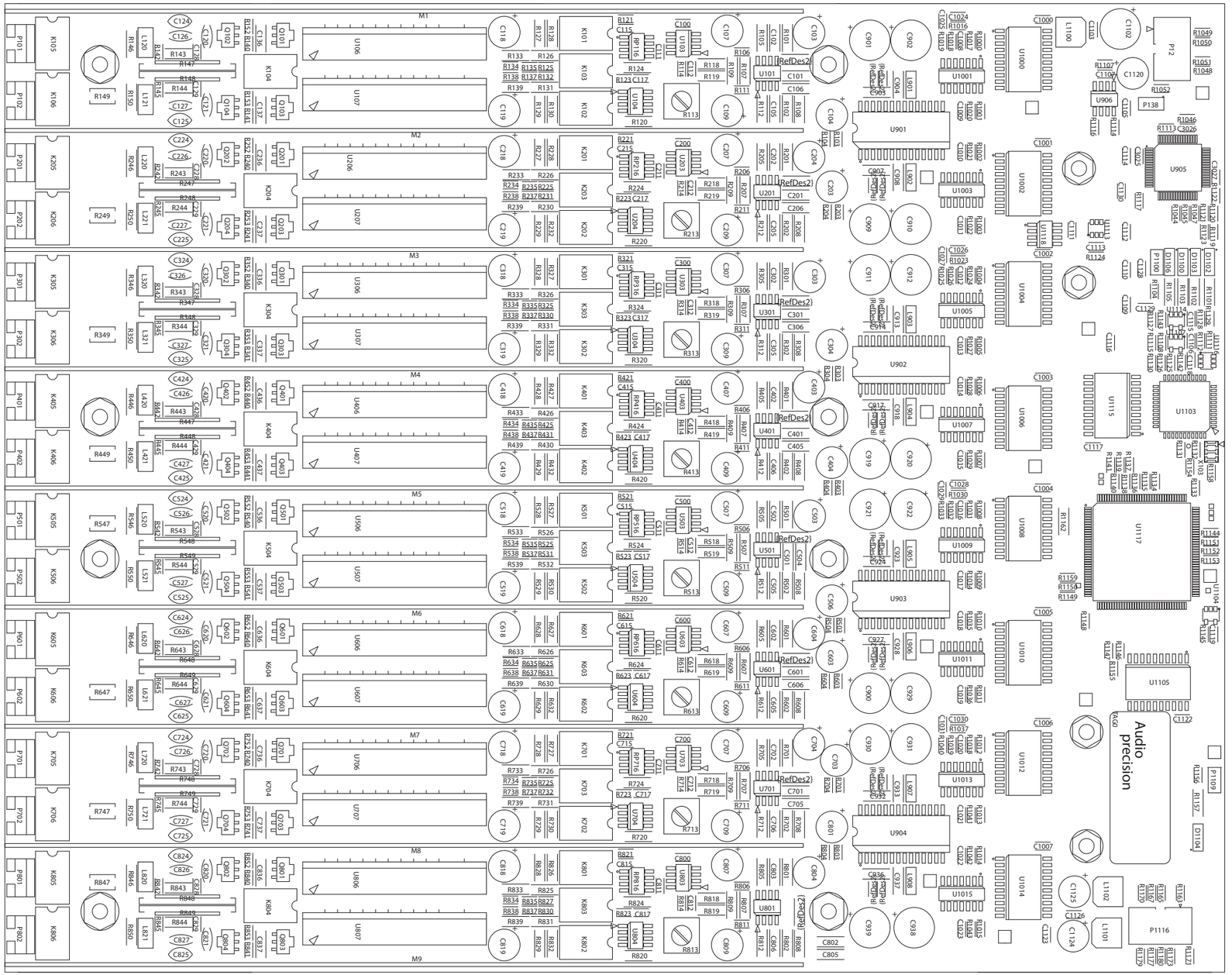

Figure 7-39 BCAS Analog Input Module (8-chan) (top) Rev 3

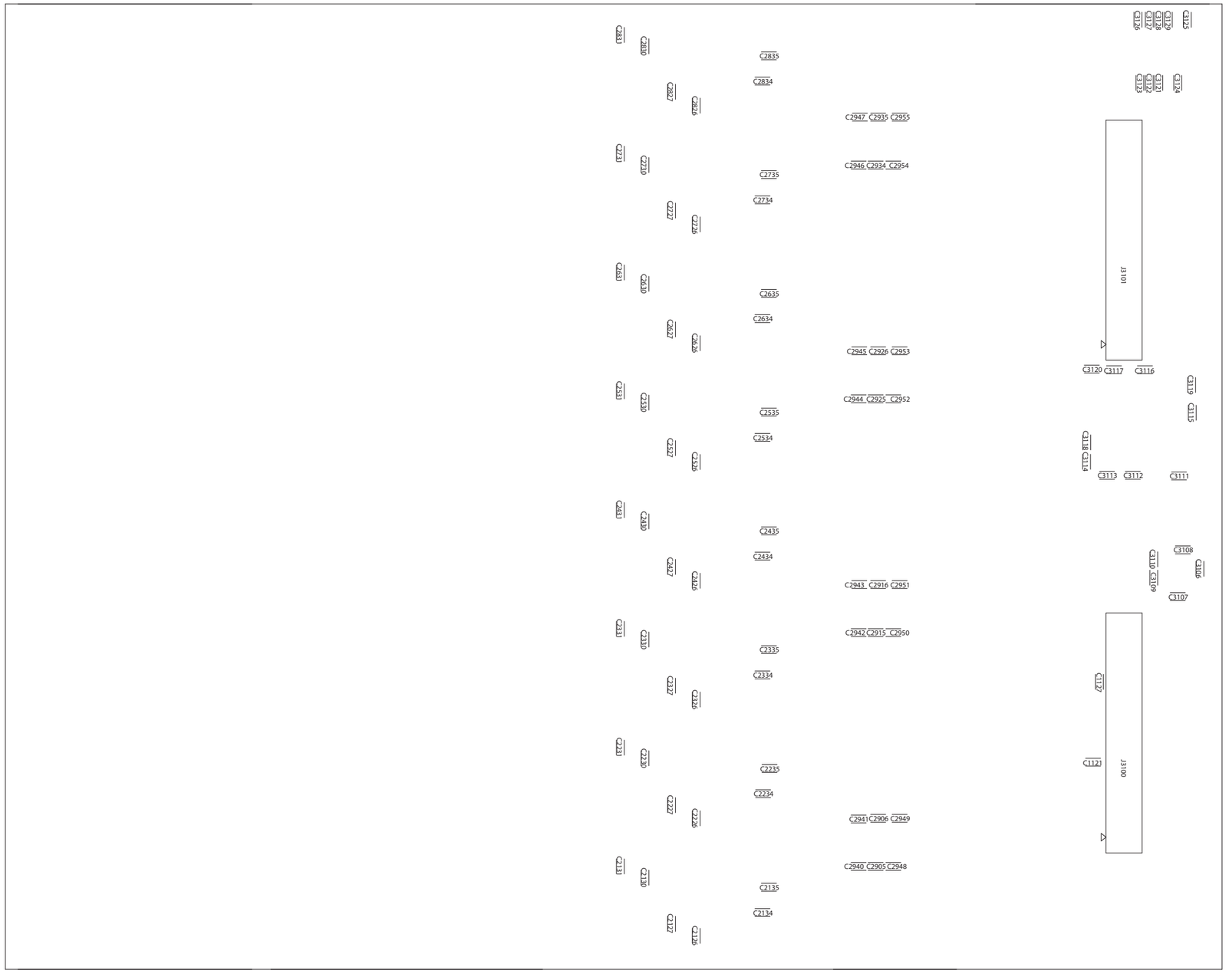

Figure 7-40 BCAS Analog Input Module (8-chan) (bottom) Rev 3

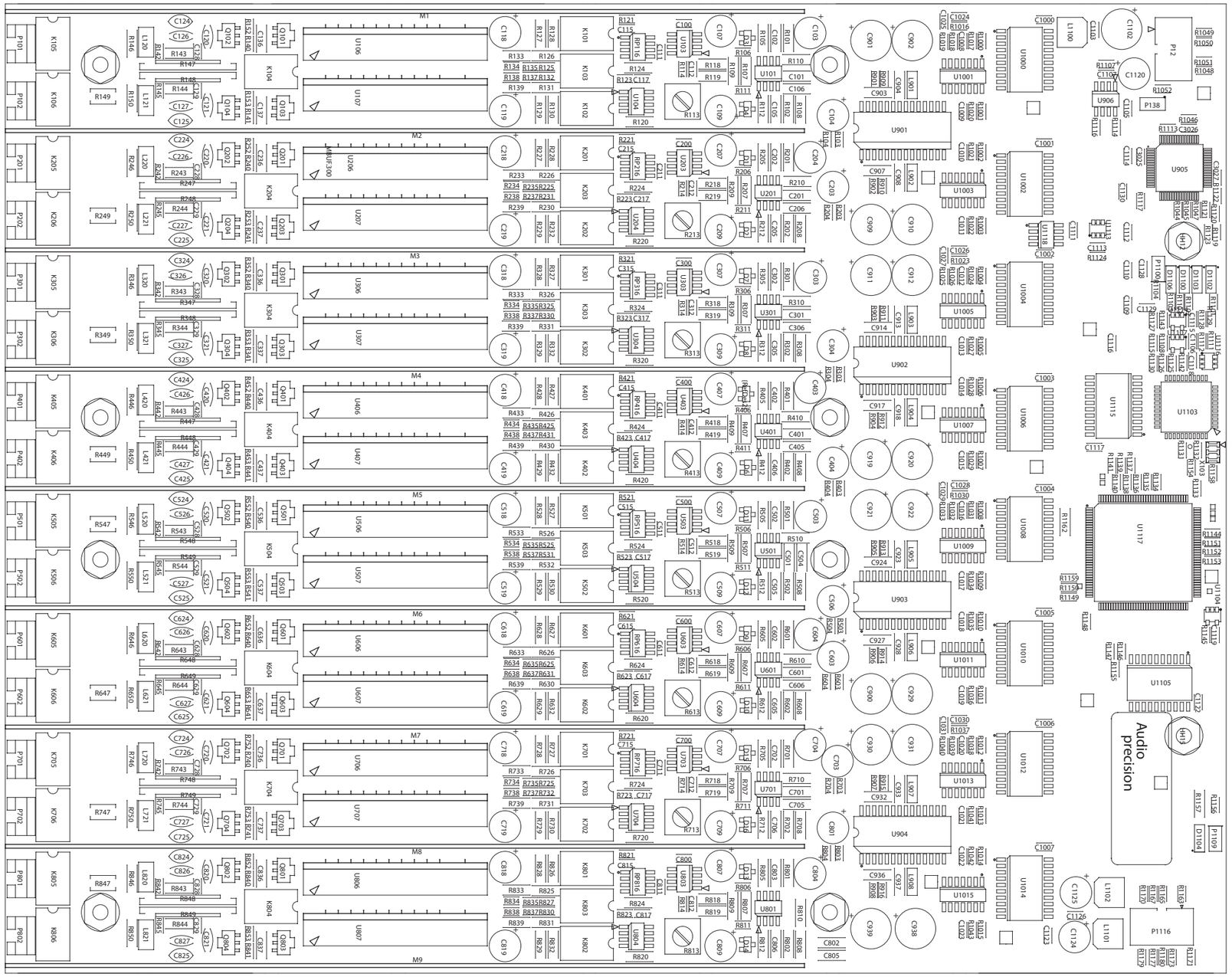

Figure 7-41 BCAS Analog Input Module (8-chan) (top) Rev 4

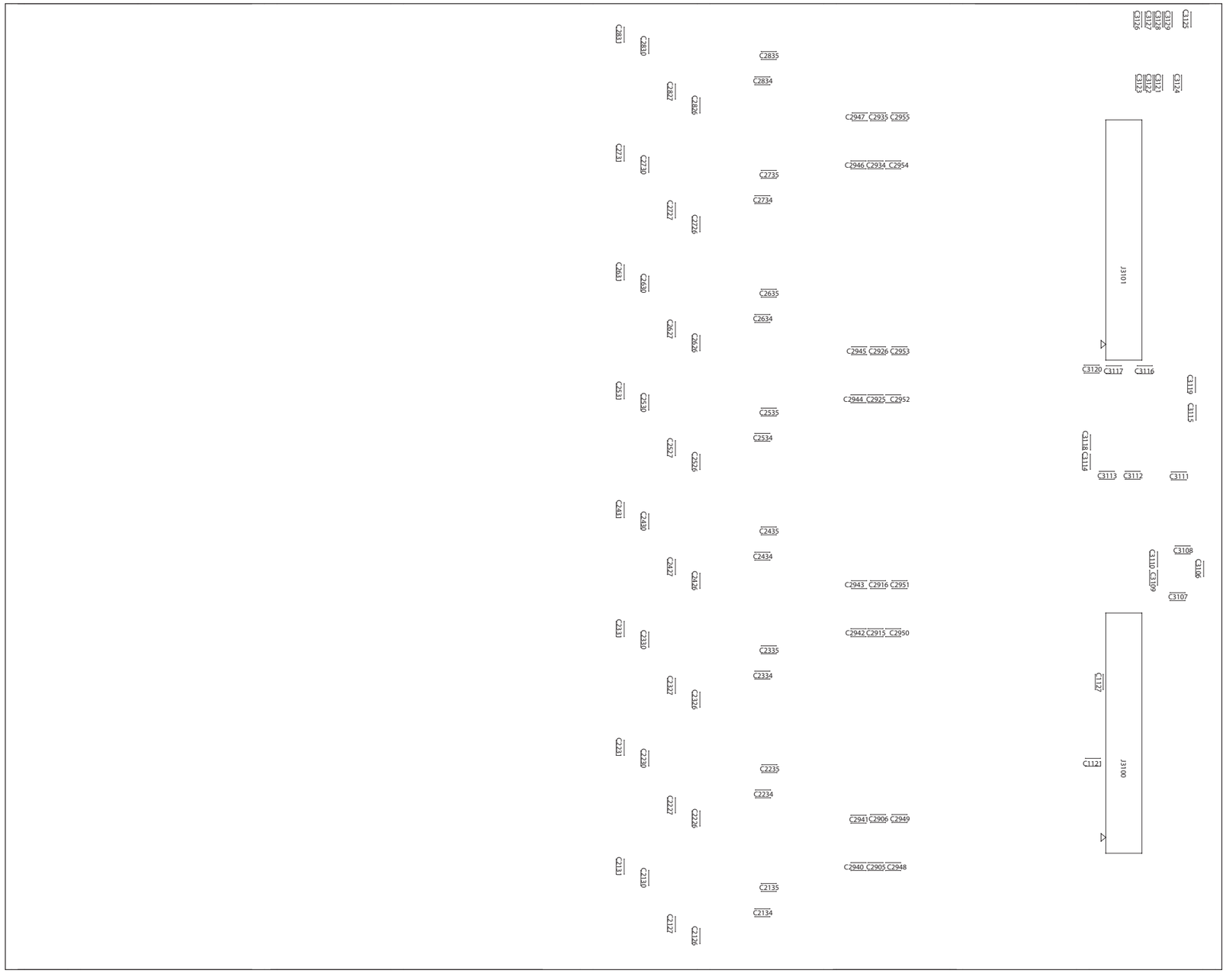

Figure 7-42 BCAS Analog Input Module (8-chan) (bot) Rev 4

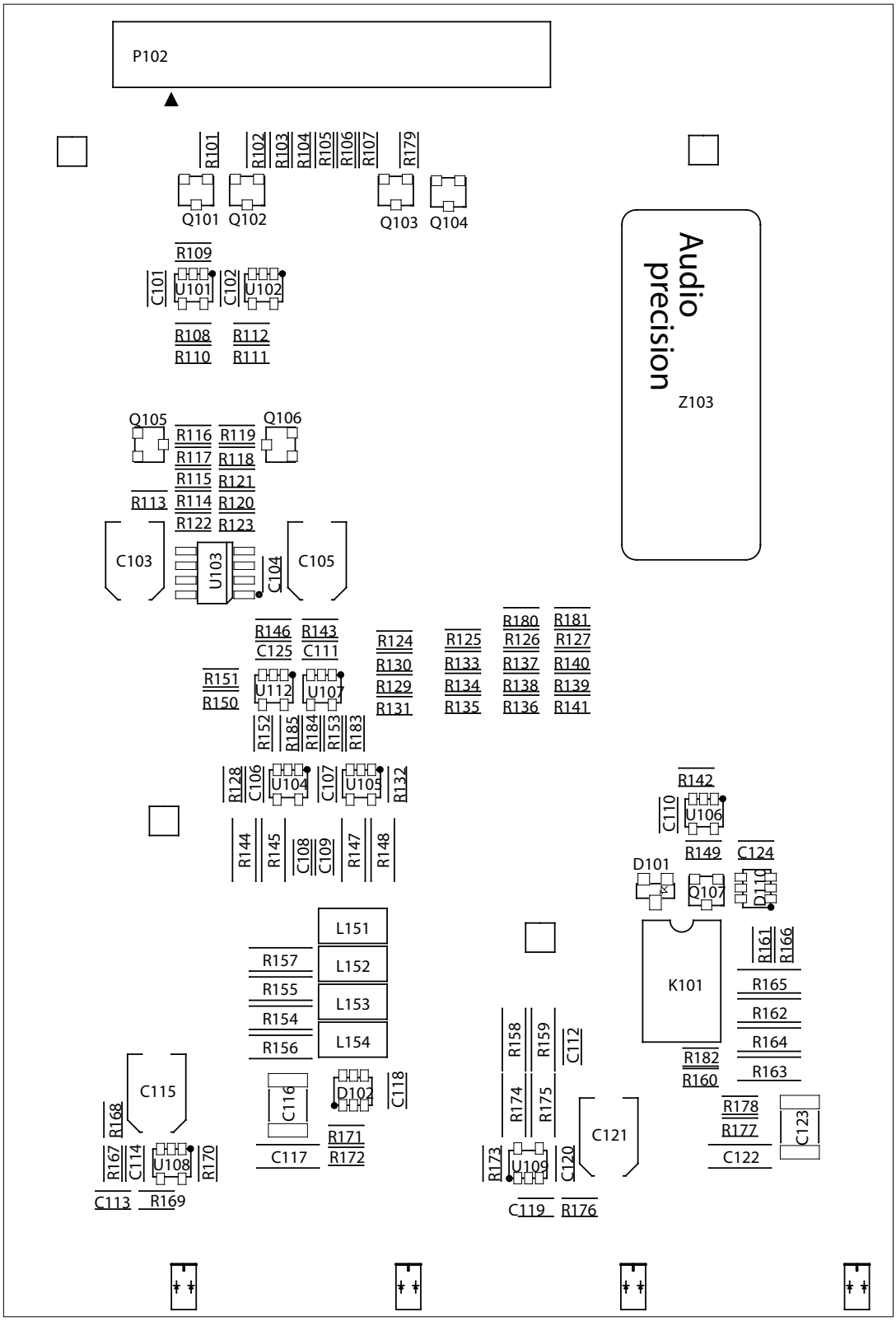

Figure 7-43 BCIF Digital I/O Panel Module (unbalanced only, early units) Rev 0

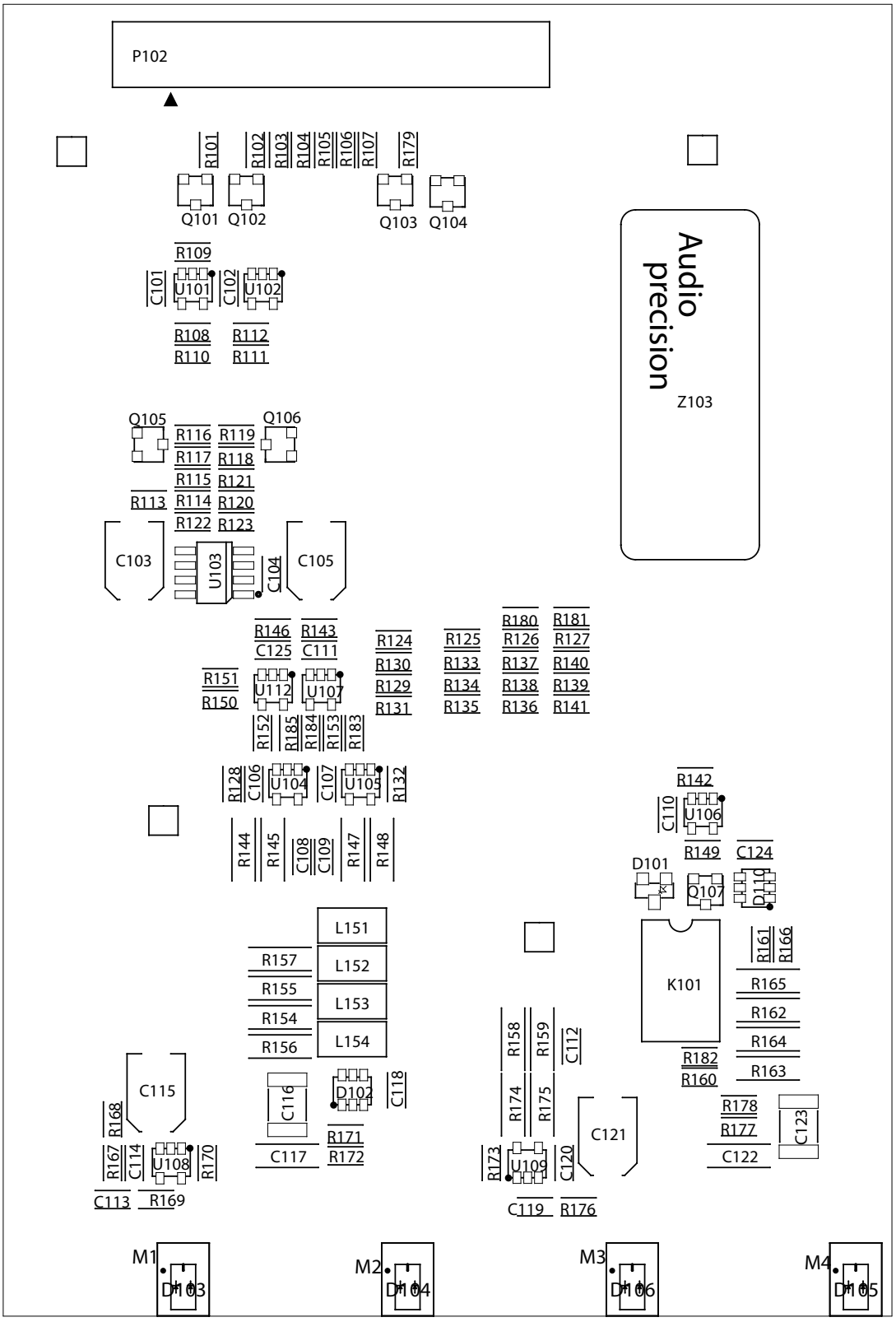

Figure 7-44 BCIF Digital I/O Panel Module (unbalanced only, early units) Rev 1

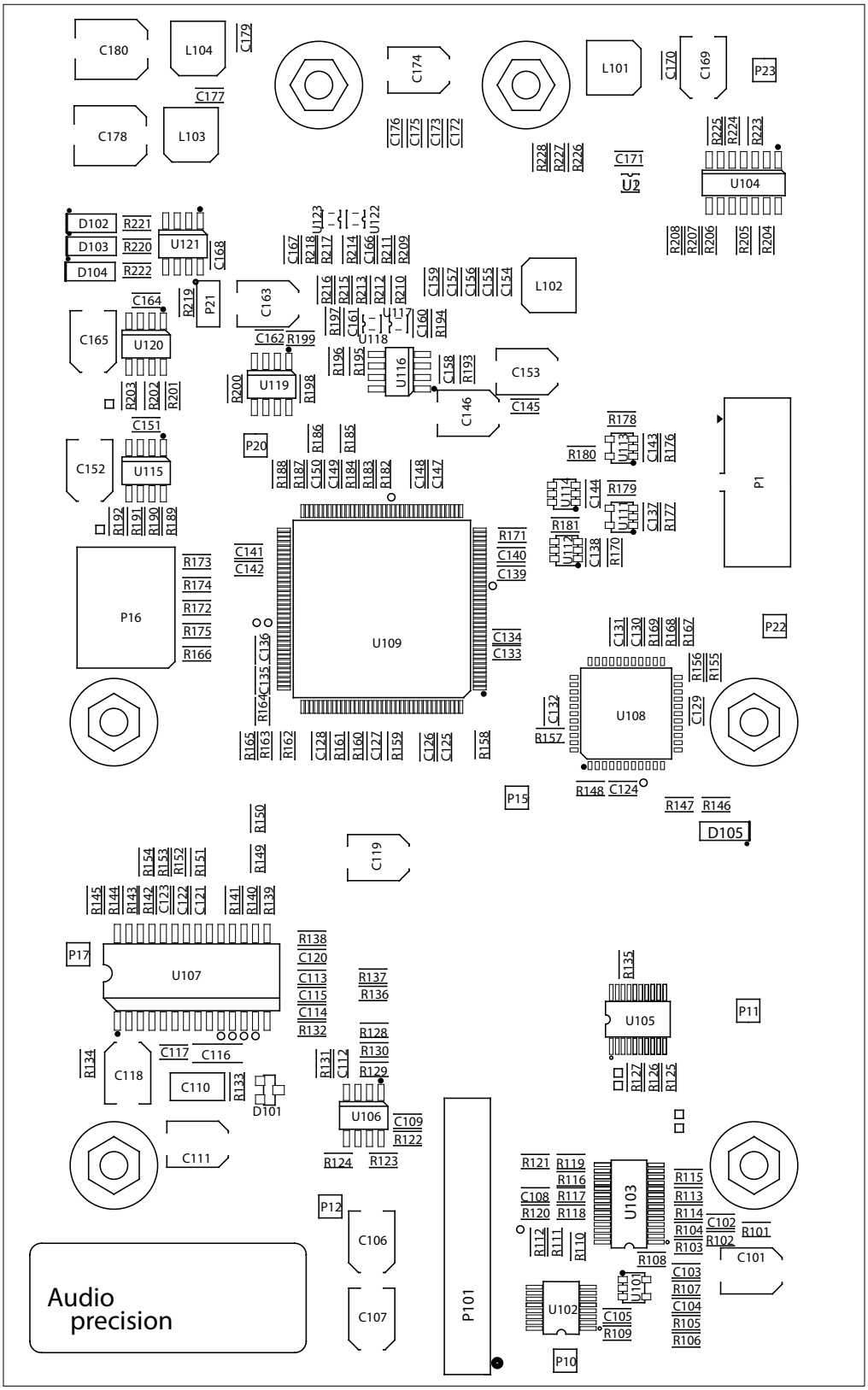

Figure 7-45 BCRO Digital I/O Main Module (unbalanced only, early units) Rev 0

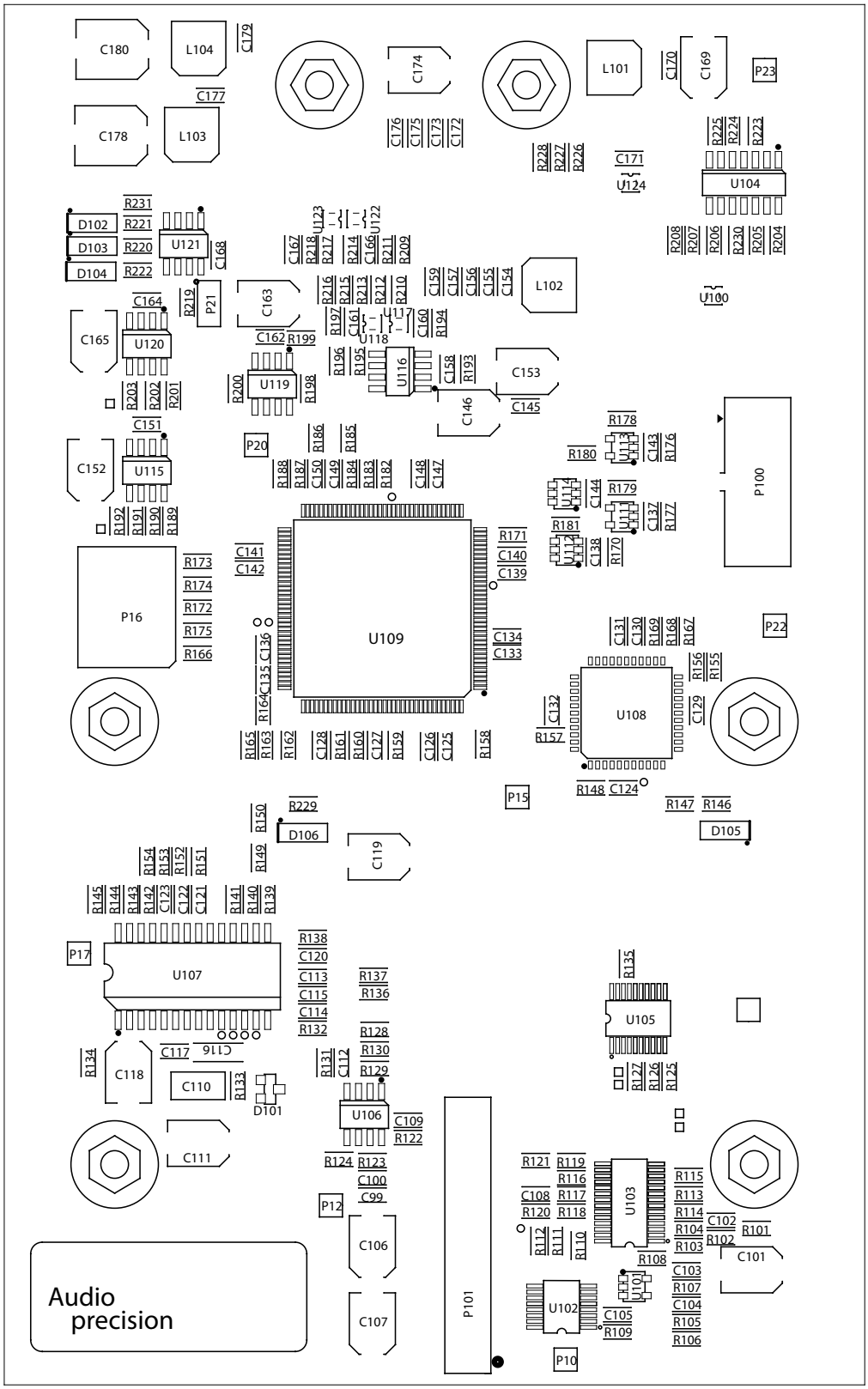

Figure 7-46 BCRO Digital I/O Main Module (unbalanced only, early units) Rev 1

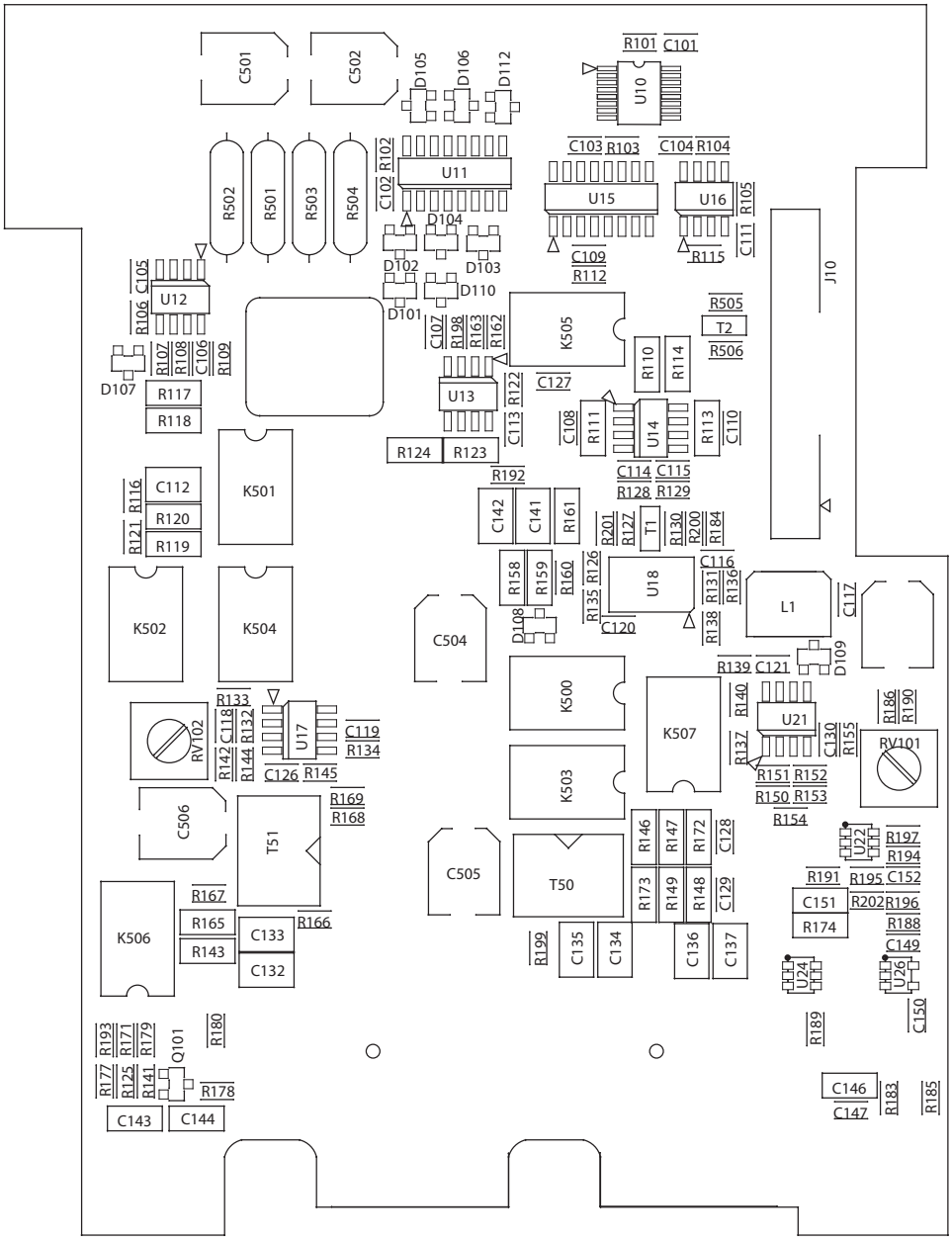

Figure 7-47 BDIF Advanced DIO Front Panel Rev 0

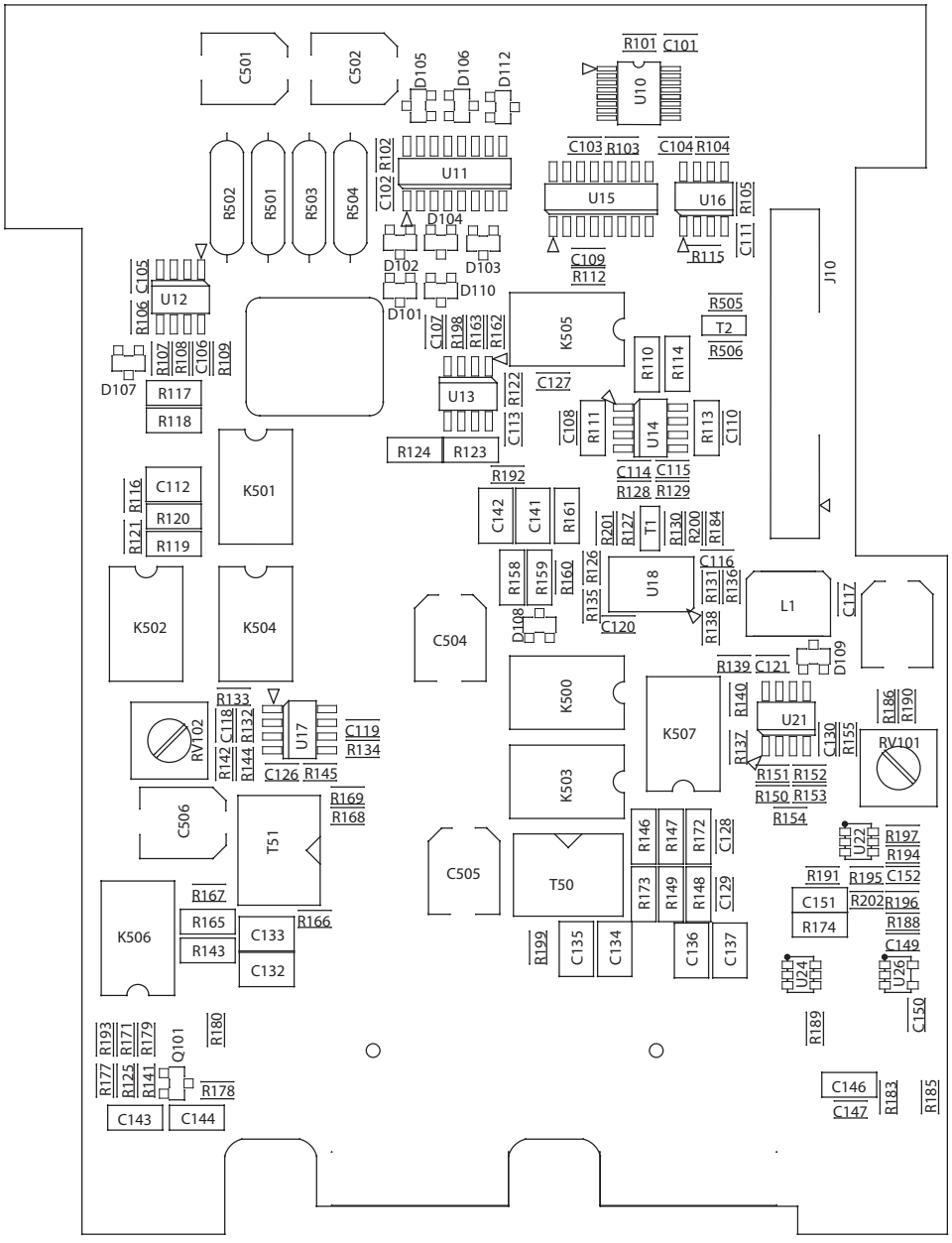

Figure 7-48 BDIF Advanced DIO Front Panel Rev 1

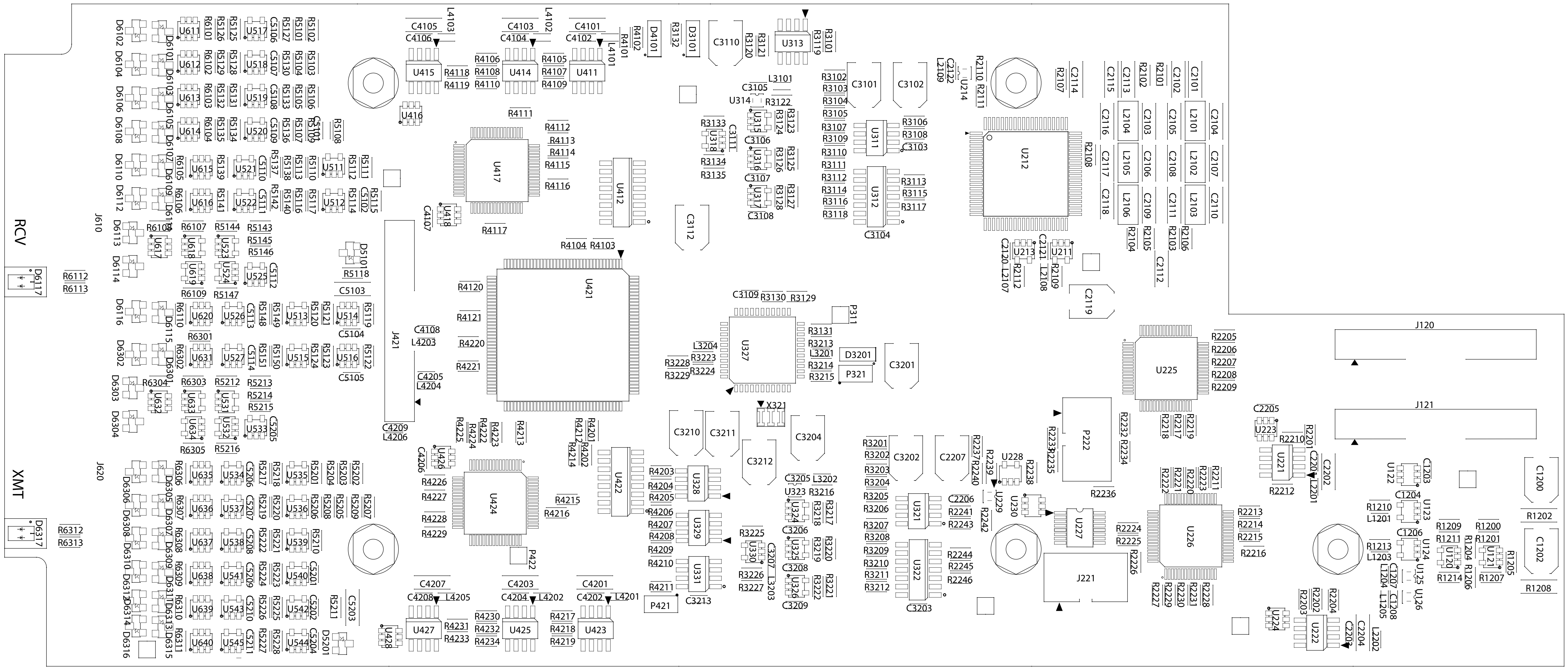

Figure 7-49 BDSA Digital Serial I/O Main Module (top) Rev 0

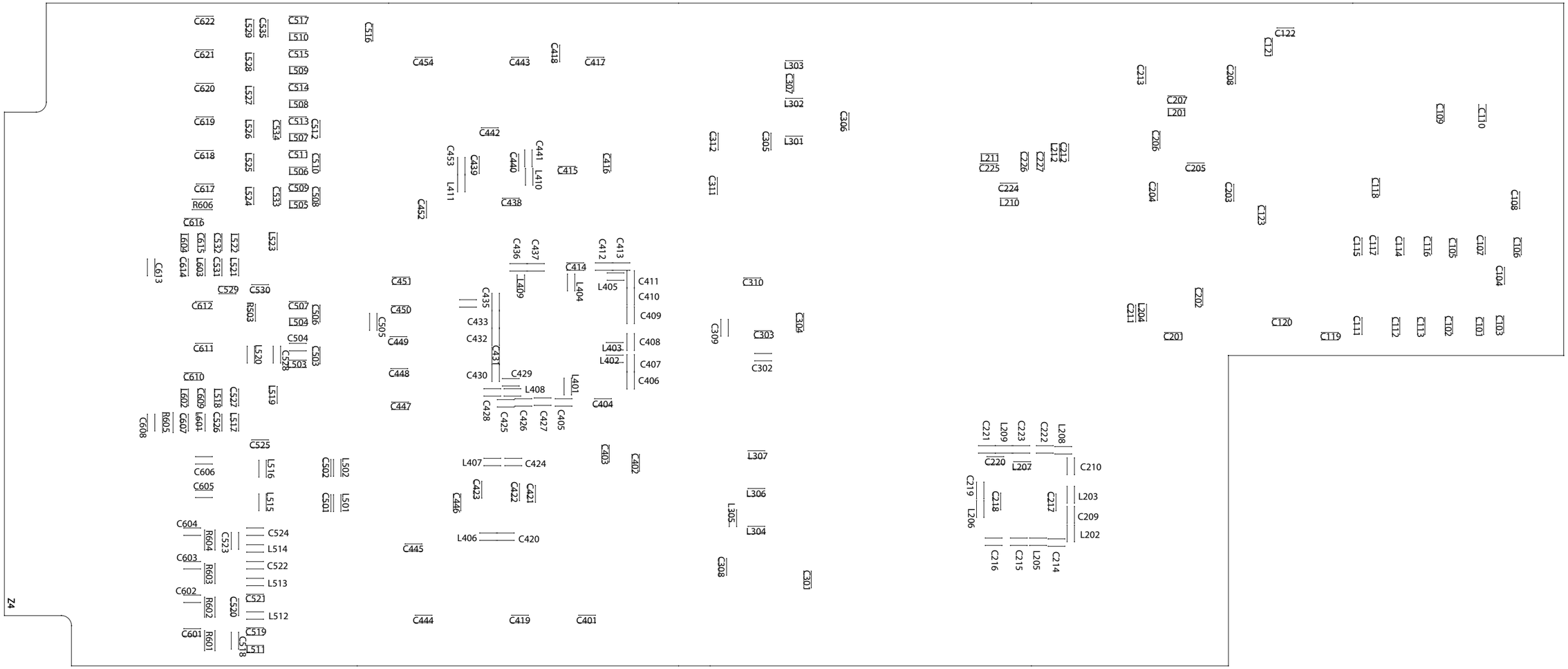

Figure 7-50 BDSA Digital Serial I/O Main Module (bottom) Rev 0

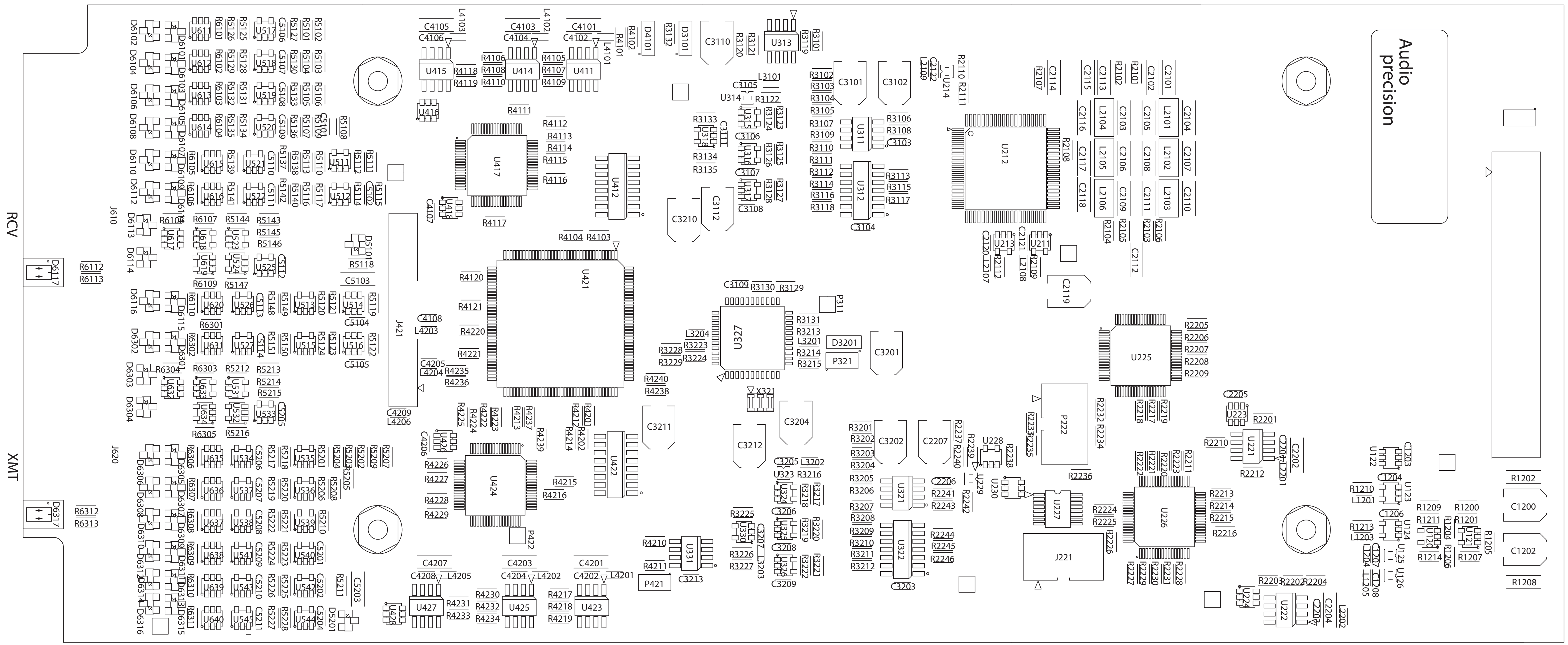

Figure 7-51 BDSA Digital Serial I/O Main Module (top) Rev 1

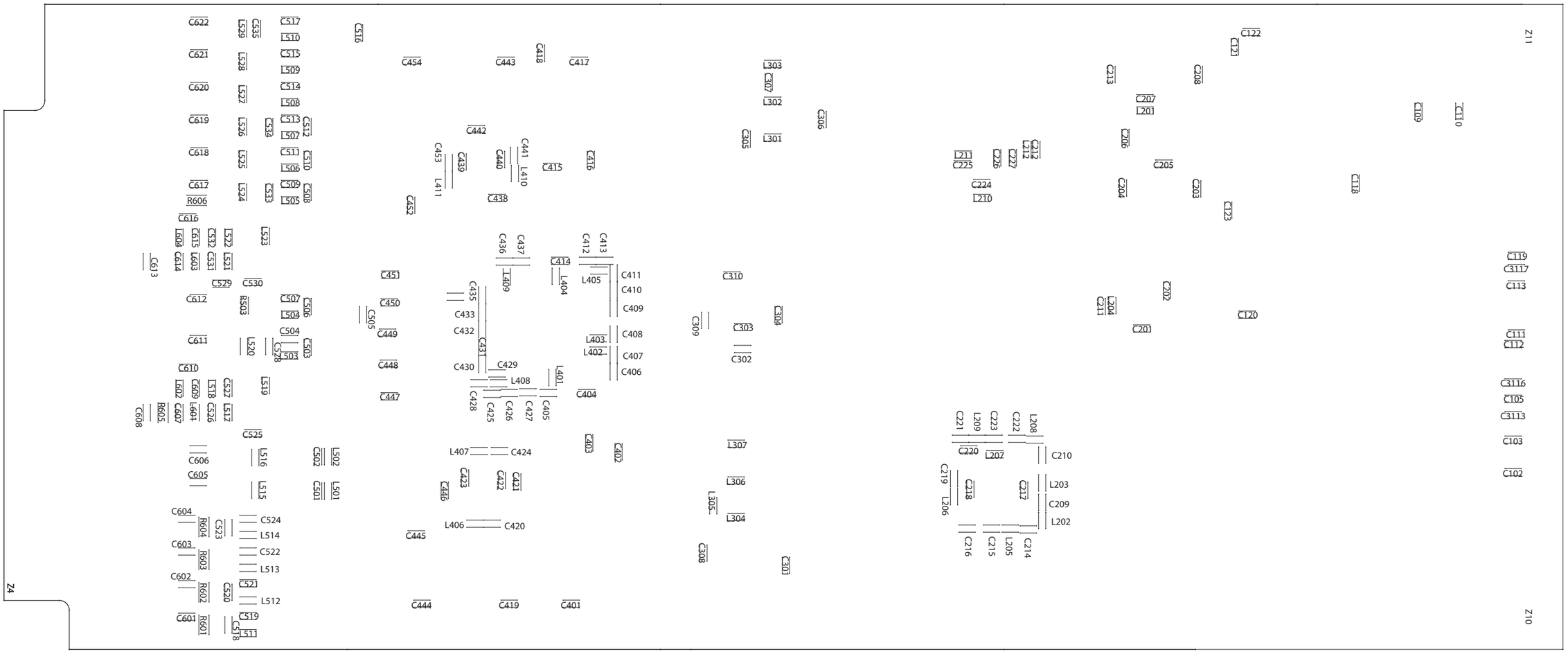

Figure 7-52 BDSA Digital Serial I/O Main Module (bottom) Rev 1

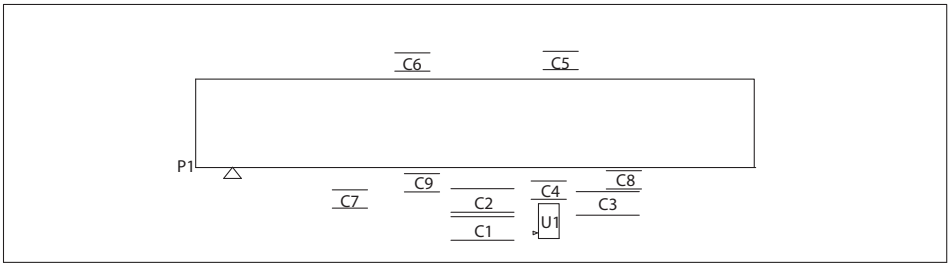

Figure 7-53 BERT MOLEX to ERNI Connector Adapter (top) Rev 0

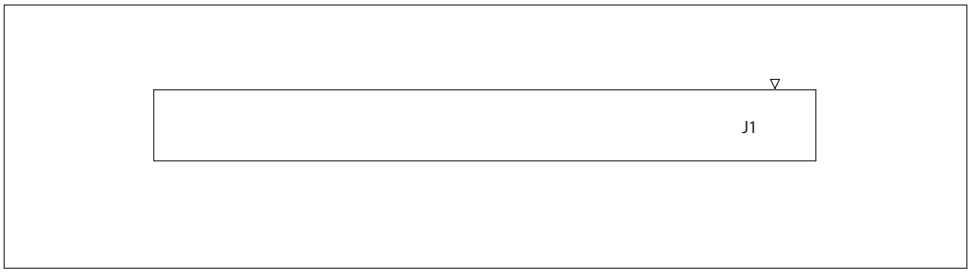

Figure 7-54 BERT MOLEX to ERNI Connector Adapter (bottom) Rev 0

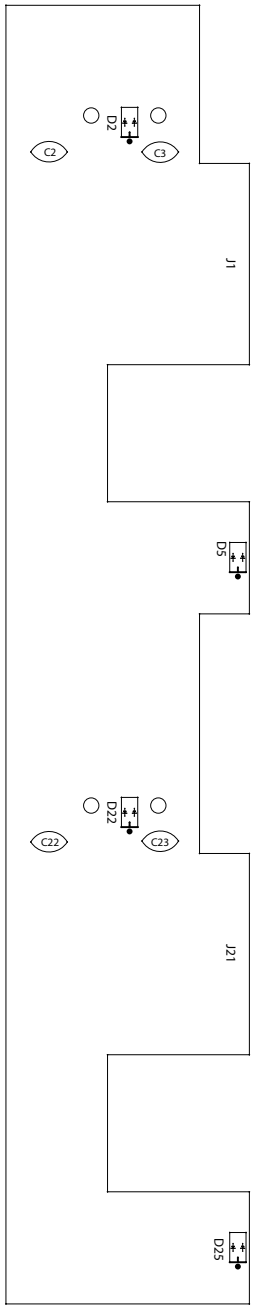

Figure 7-55 BIFP Analog Input Front Panel Module (2-chan) (top) Rev 0

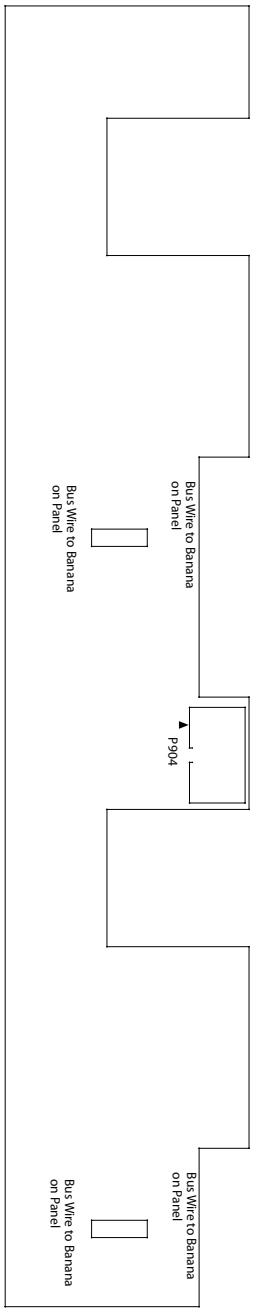

Figure 7-56 BIFP Analog Input Front Panel Module (2-chan) (bottom) Rev 0

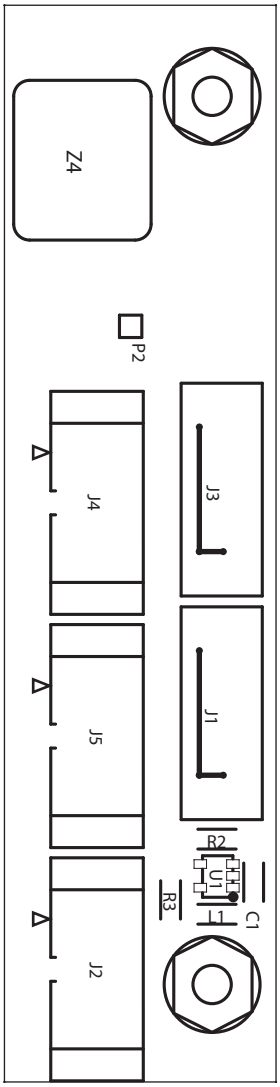

Figure 7-57 BJIT DSIO Jitter Module Rev 0

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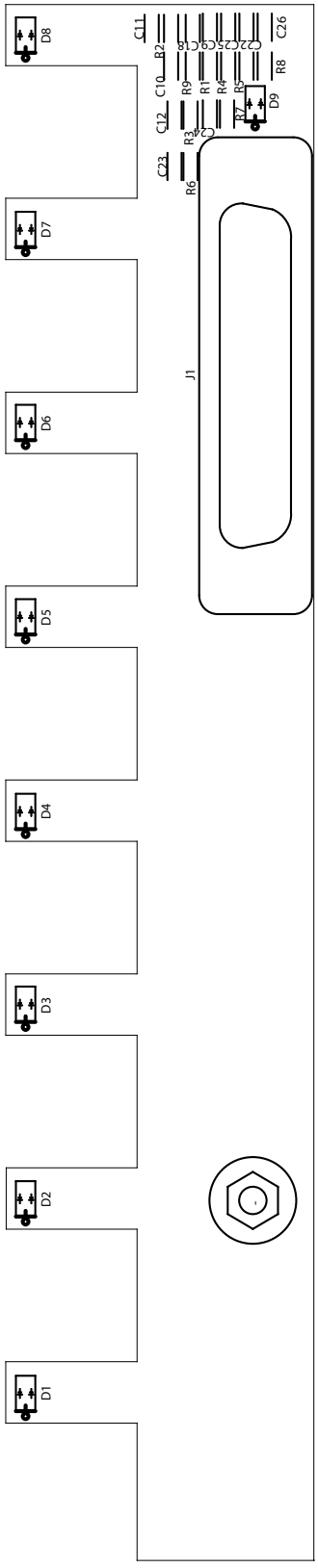

Figure 7-58 BLED Analog I/O LED Front Panel Module (8-chan) (top) Rev 0

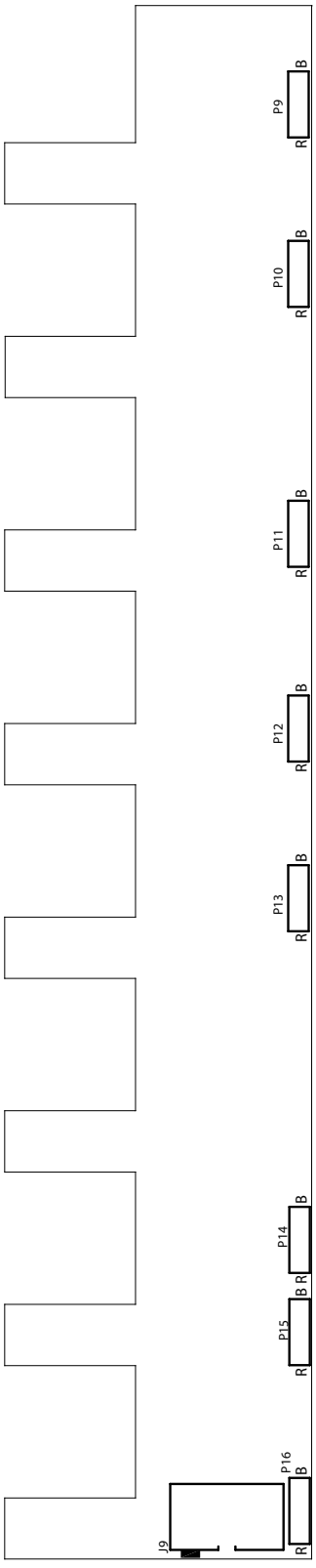

Figure 7-59 BLED Analog I/O LED Front Panel Module (8-chan) (bottom) Rev 0

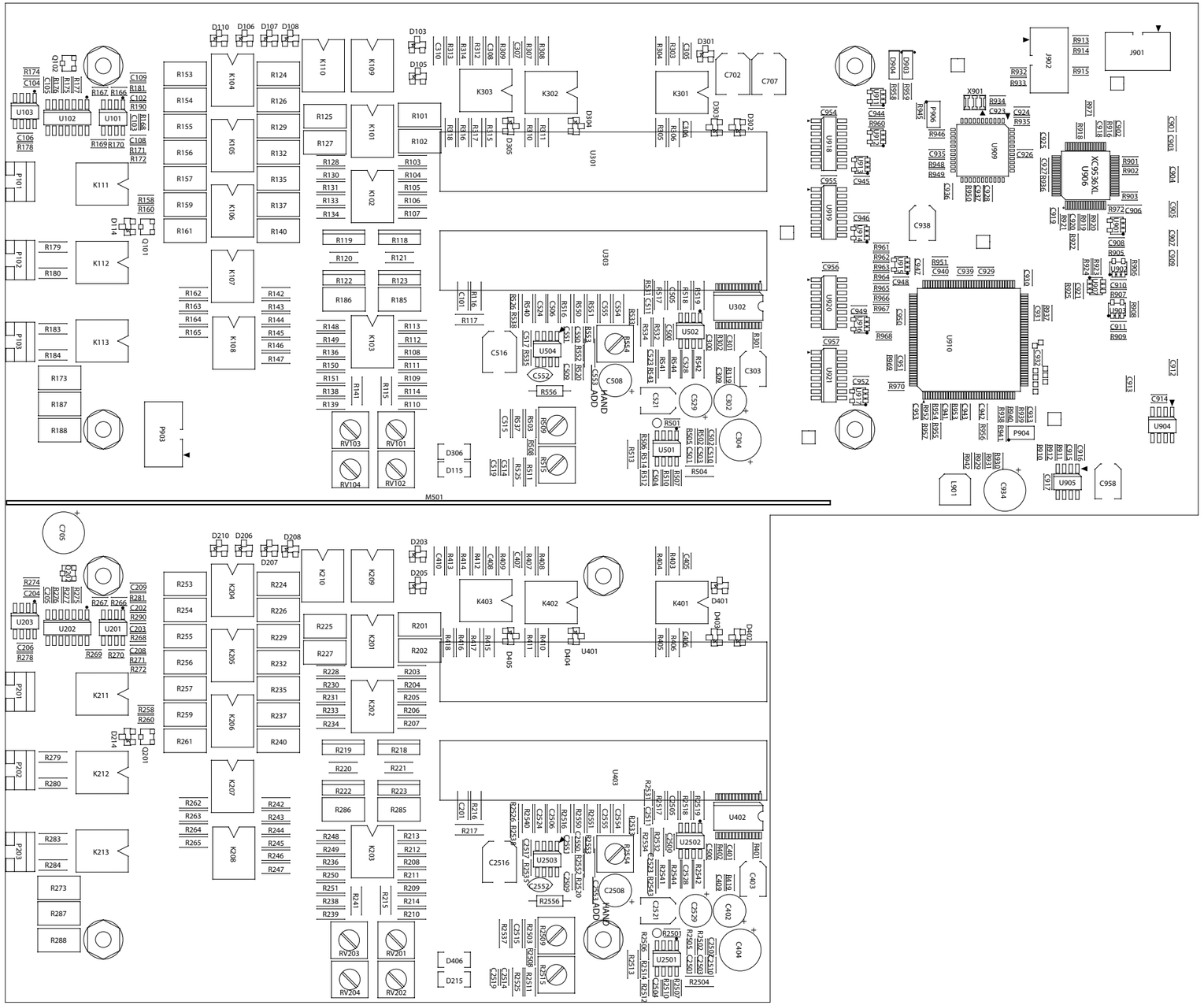

Figure 7-60 BMEG Analog Output Module (2-chan) (top) Rev 0

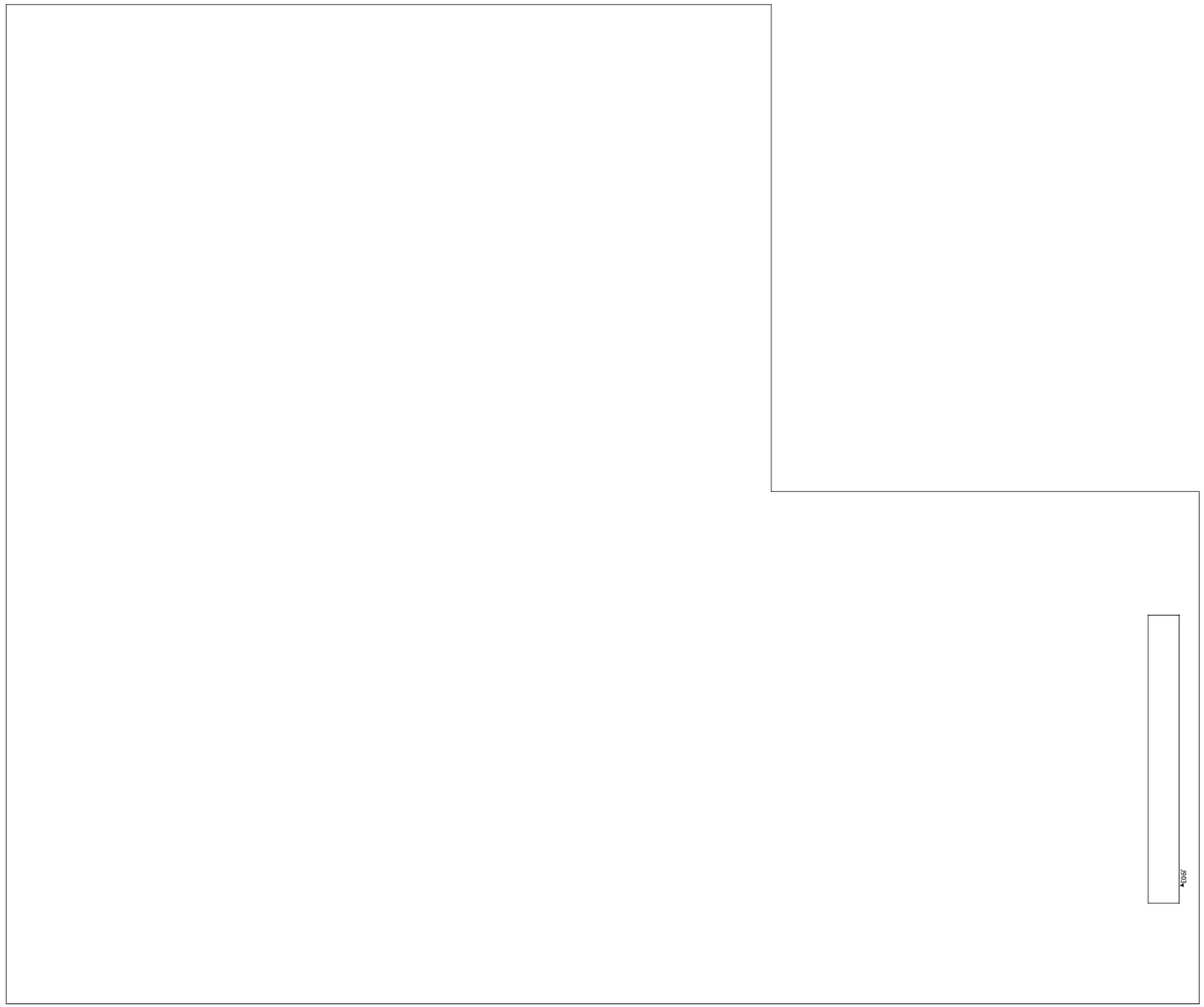

Figure 7-61 BMEG Analog Output Module (2-chan) (bottom) Rev 0

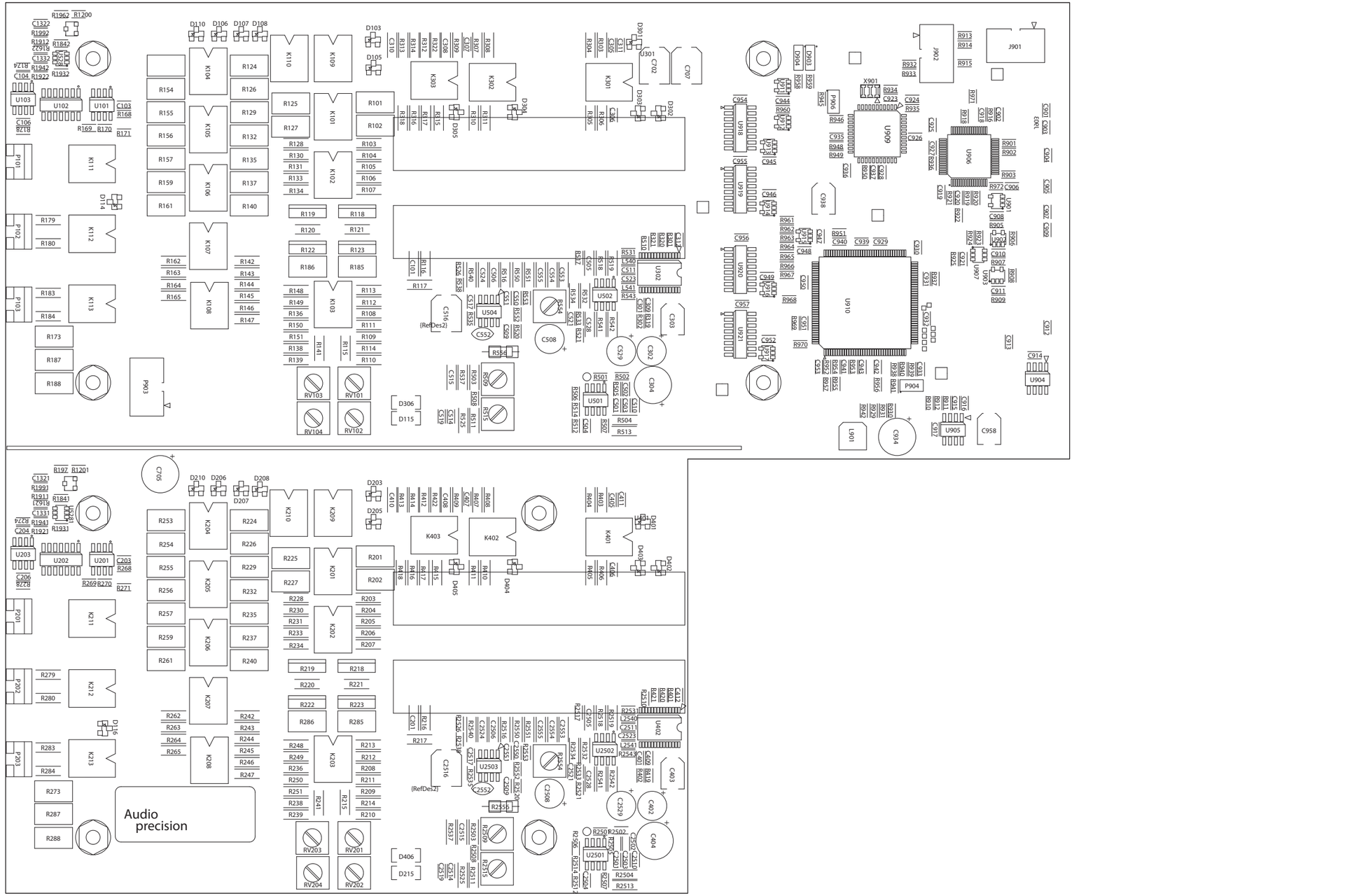

Figure 7-62 BMEG Analog Output Module (2-chan) (top) Rev 1

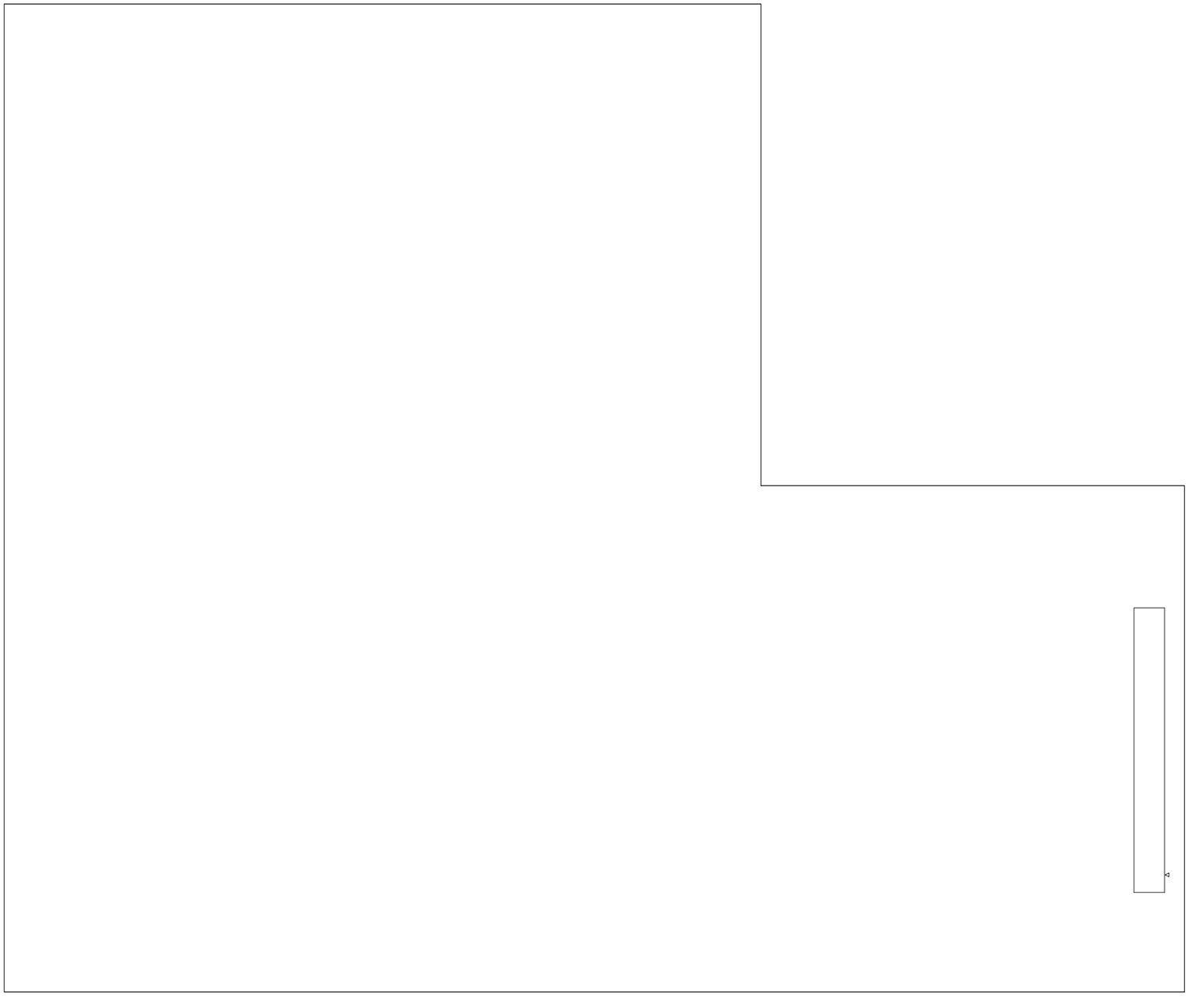

Figure 7-63 BMEG Analog Output Module (2-chan) (bottom) Rev 1

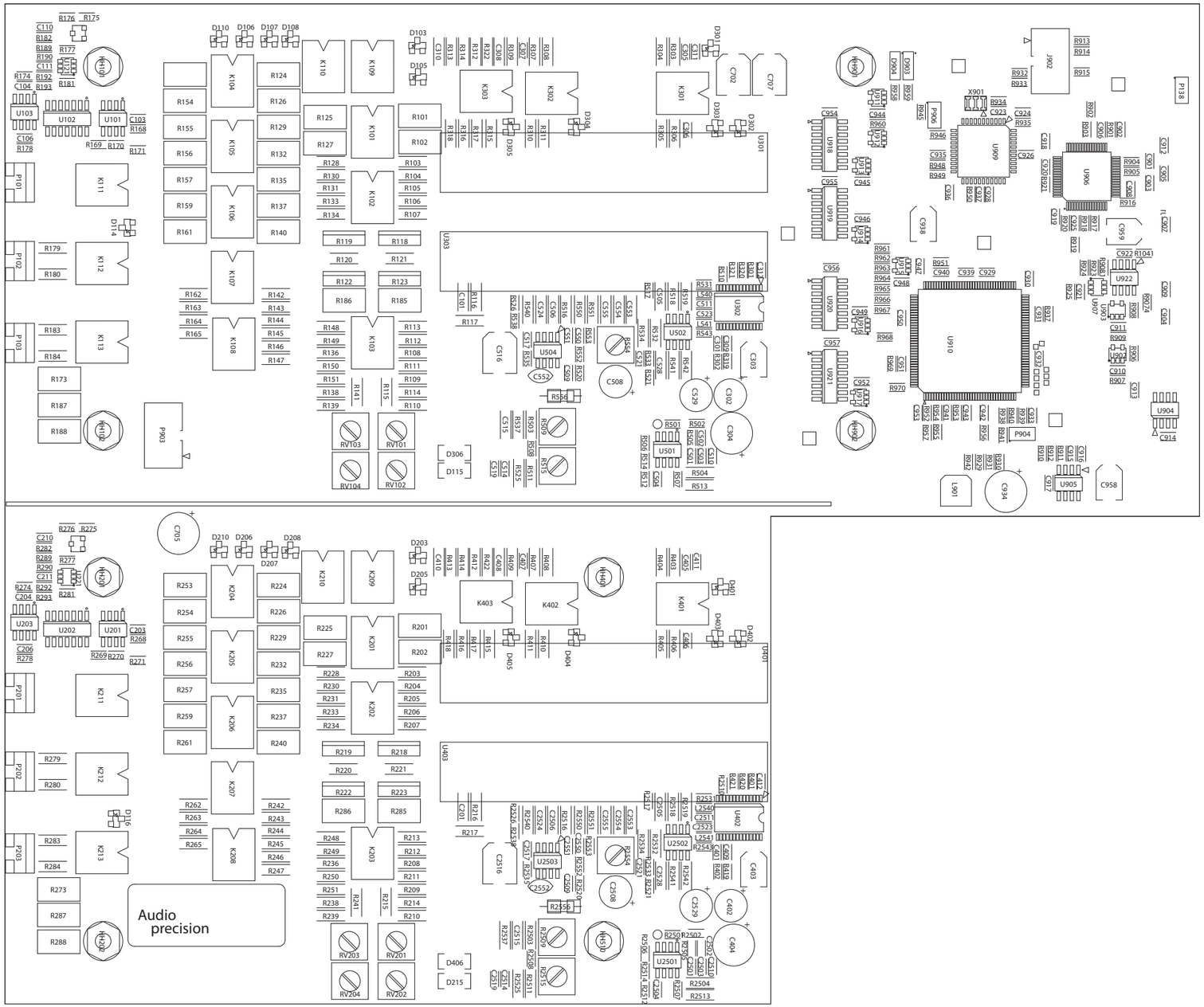

Figure 7-64 BMEG Analog Output Module (2-chan) (top) Rev 2

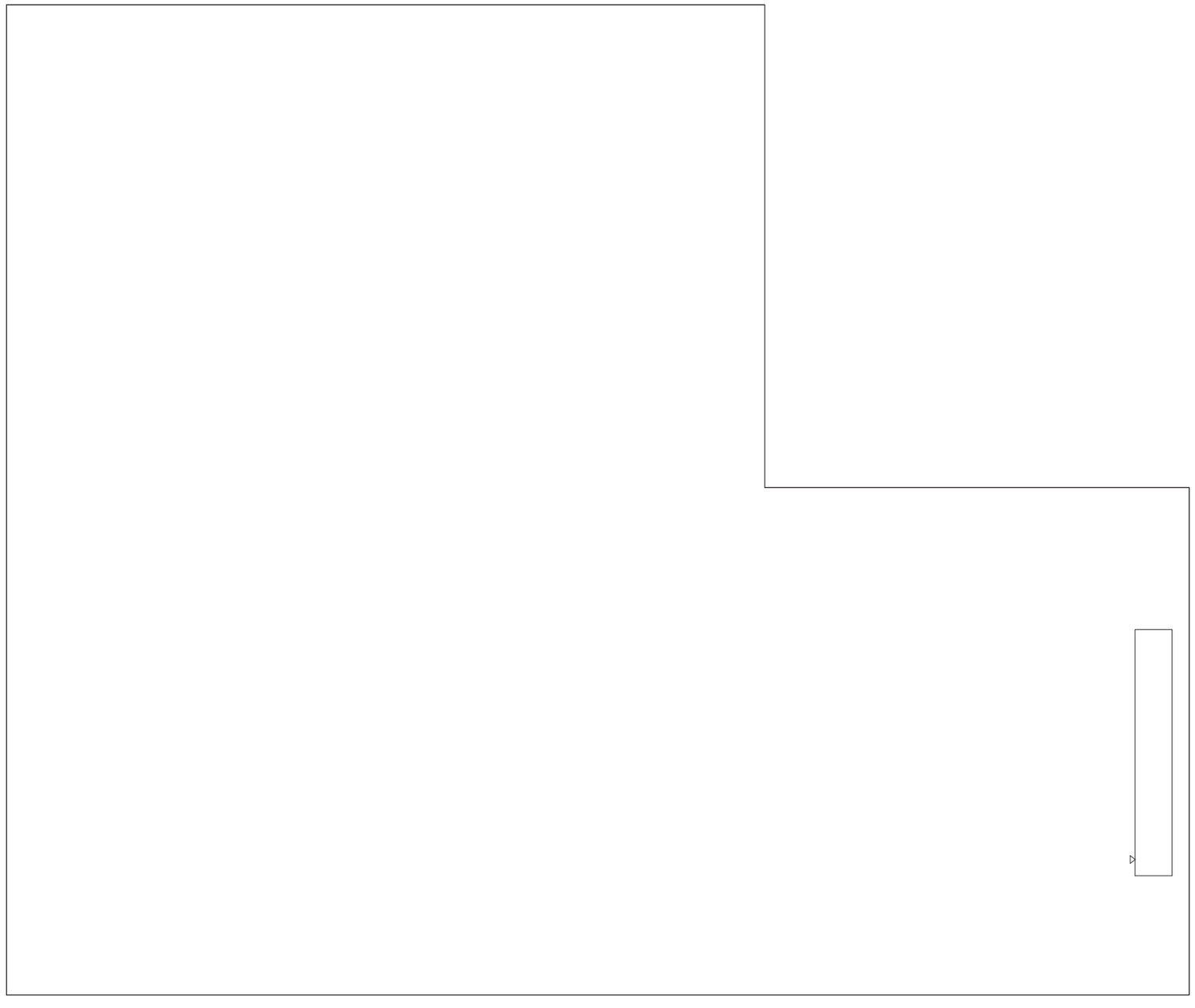

Figure 7-65 BMEG Analog Output Module (2-chan) (bottom) Rev 2

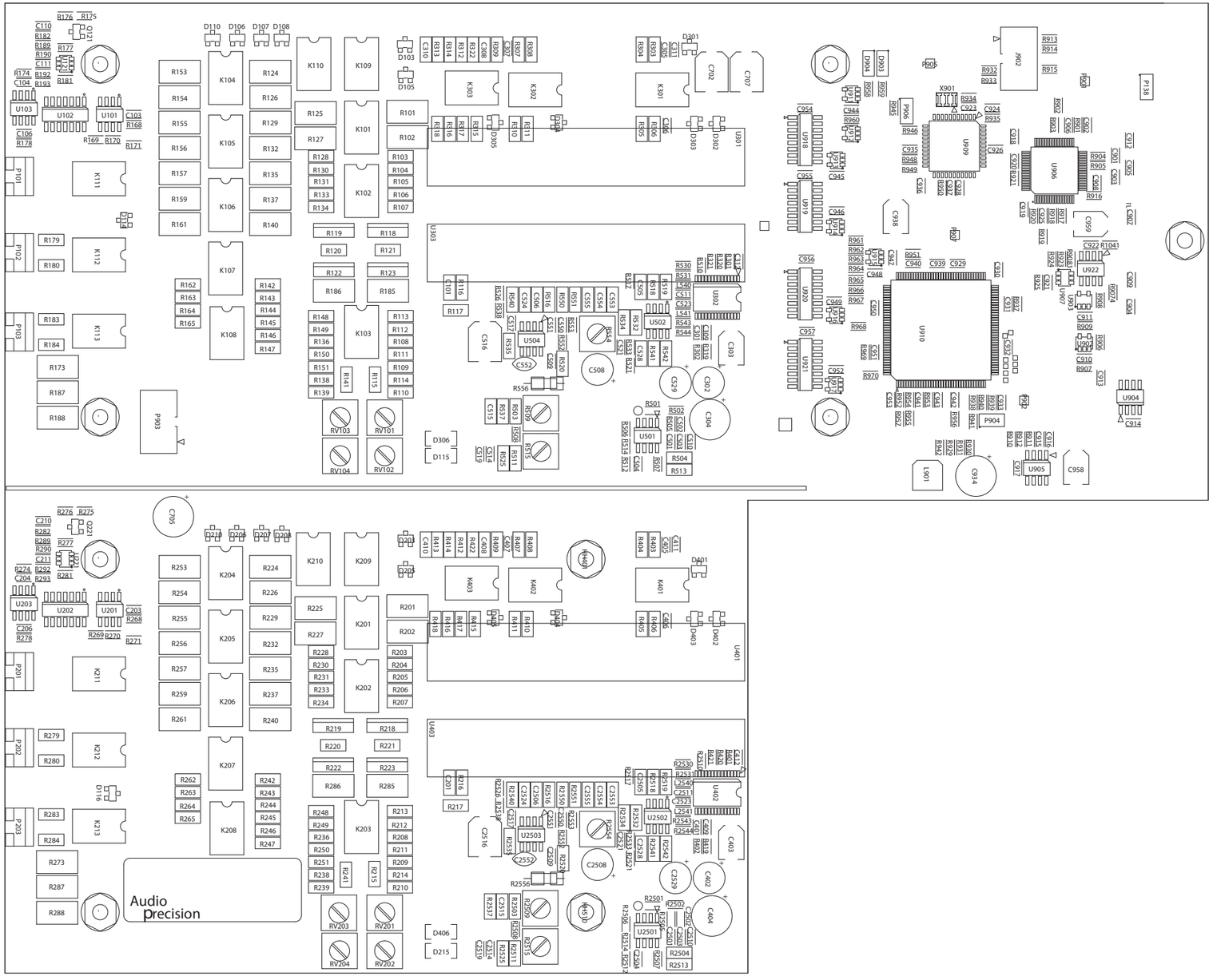

Figure 7-66 BMEG Analog Output Module (2-chan) (top) Rev 3

Figure 7-67 BMEG Analog Output Module (2-chan) (bottom) Rev 3

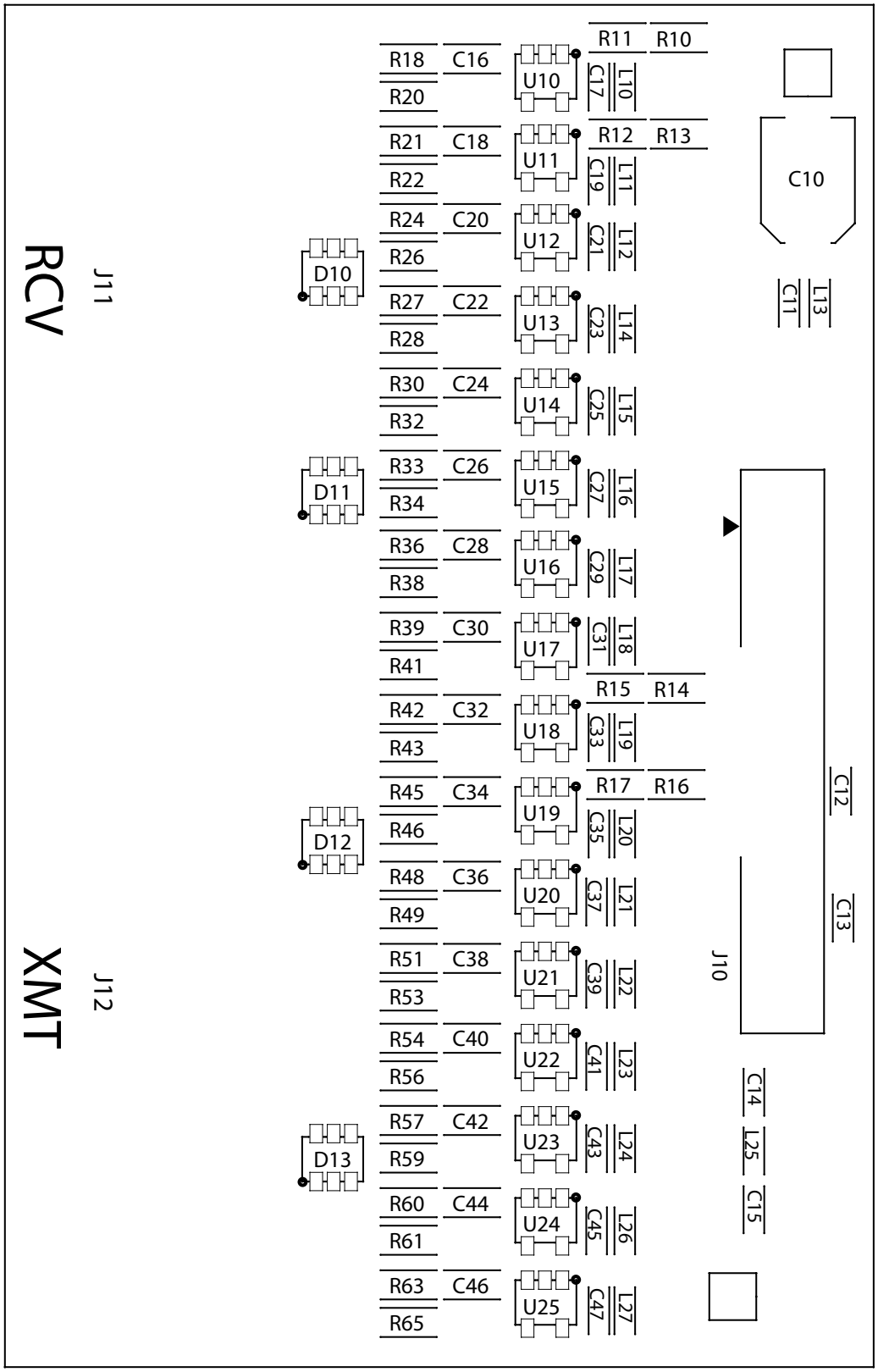

Figure 7-68 BMPA Digital Serial I/O Monitor Module Rev 0

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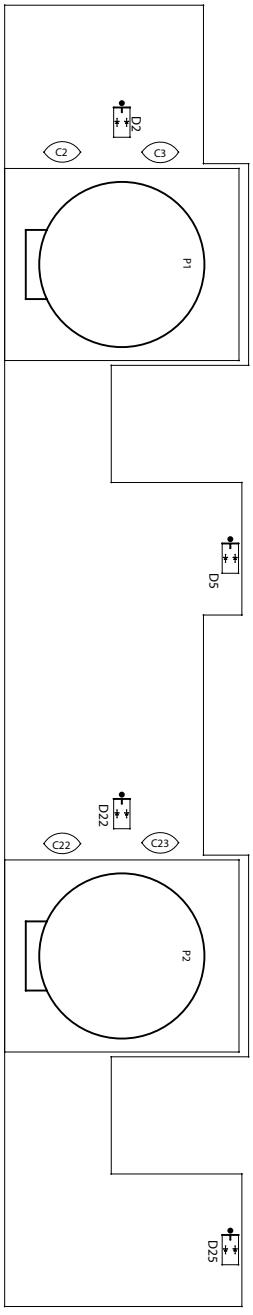

Figure 7-69 BOFP Analog Output Front Panel Module (2-chan) (top) Rev 0

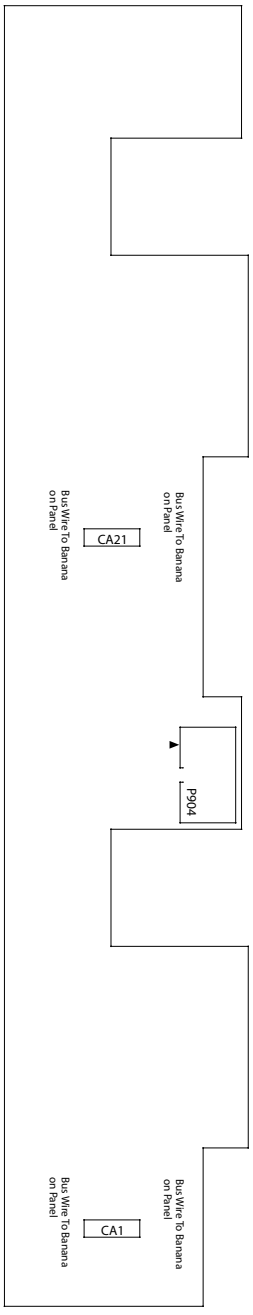

Figure 7-70 BOFP Analog Output Front Panel Module (2-chan) (bottom) Rev 0

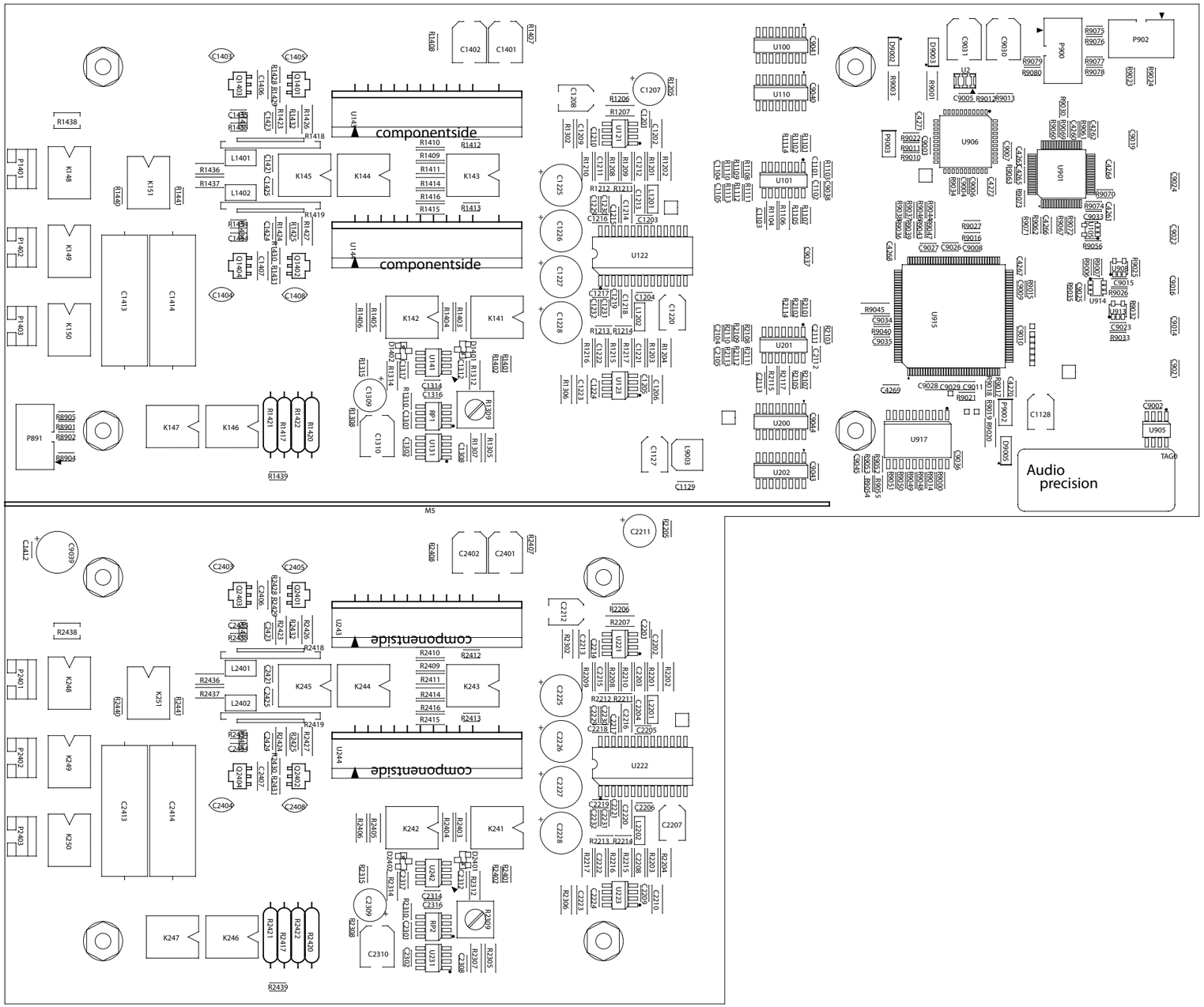

Figure 7-71 BOTA Analog Input Module (2-chan) (top) Rev 0

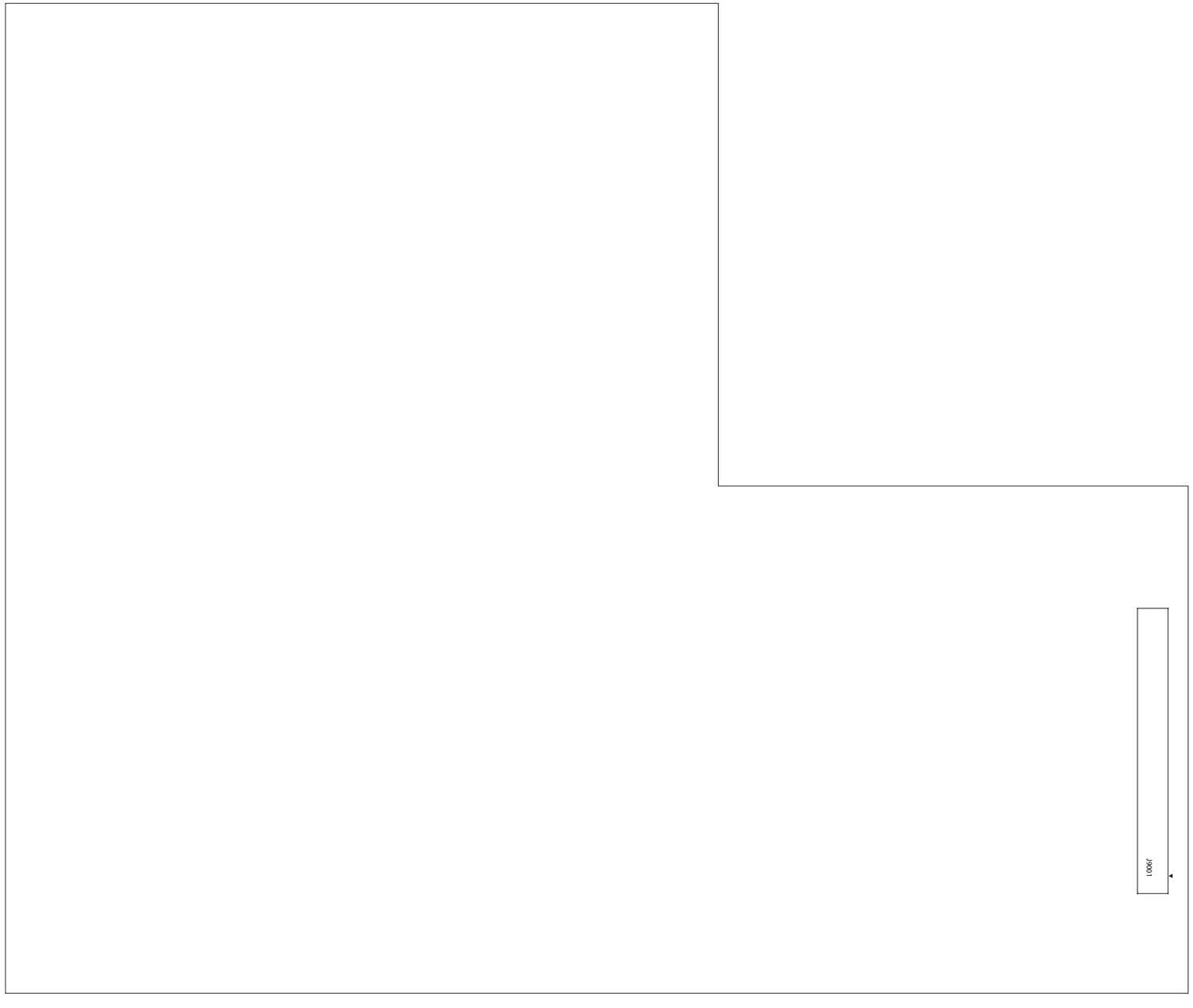

Figure 7-72 BOTA Analog Input Module (2-chan) (bottom) Rev 0

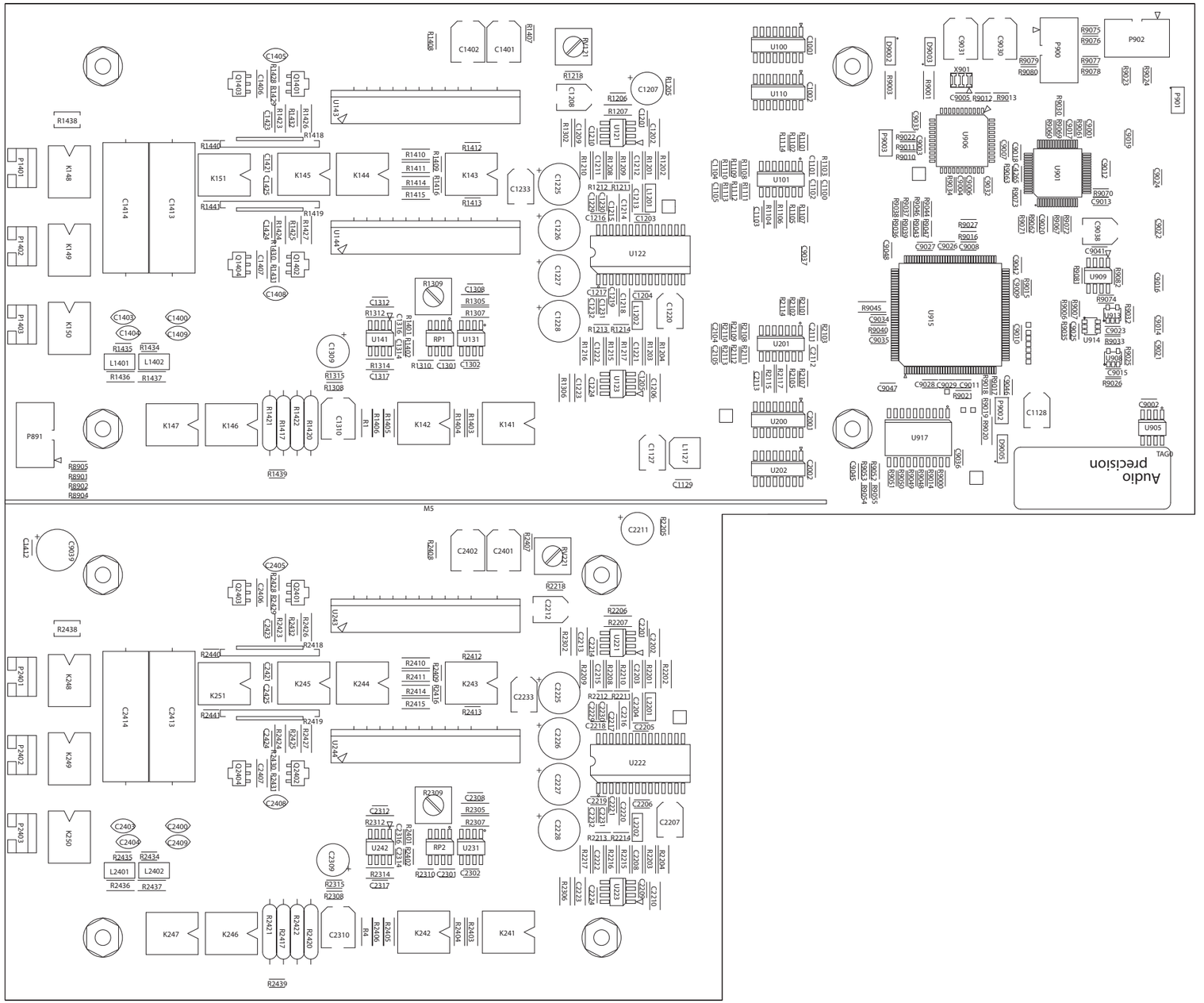

Figure 7-73 BOTA Analog Input Module (2-chan) (top) Rev 1

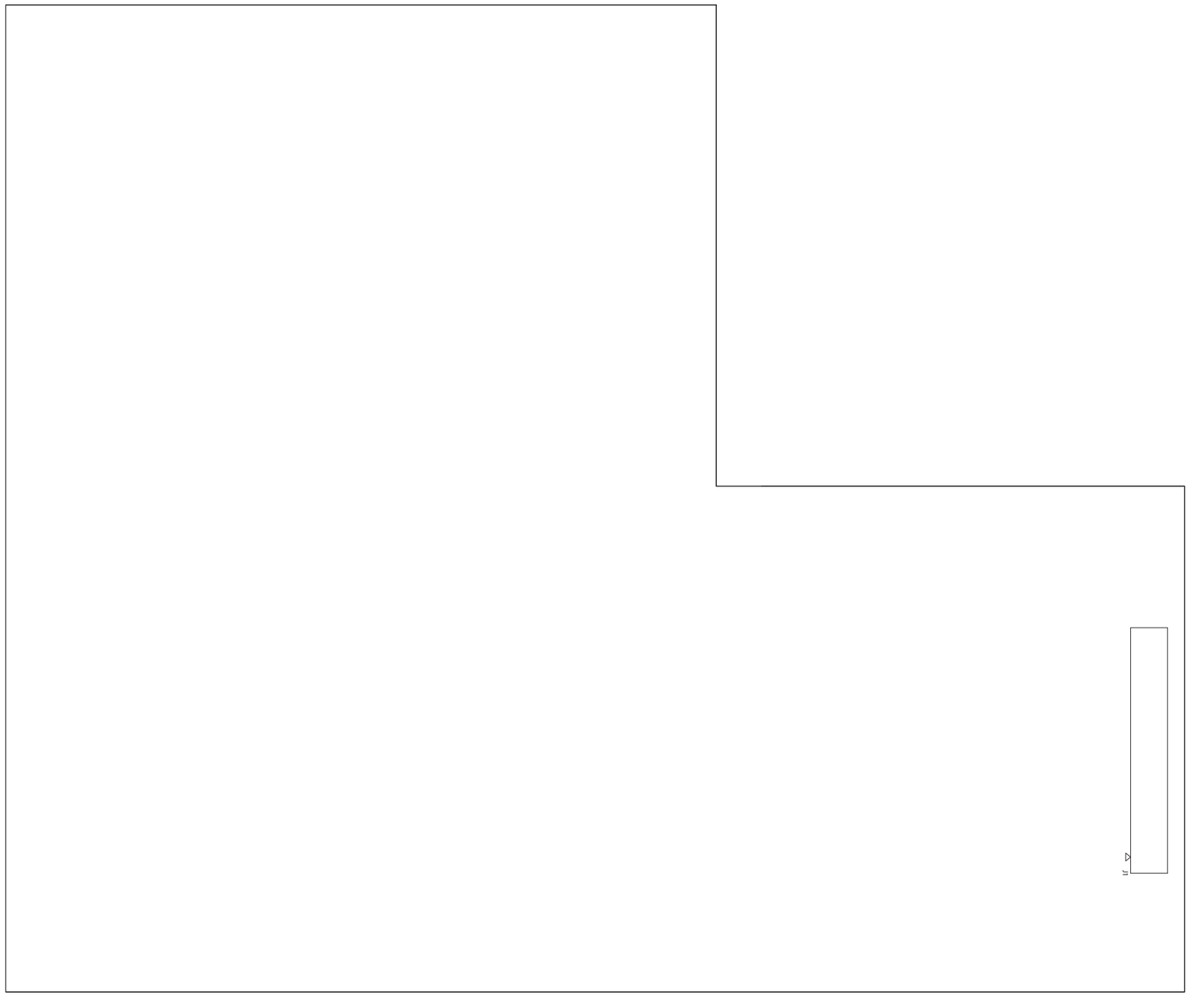

Figure 7-74 BOTA Analog Input Module (2-chan) (bottom) Rev 1

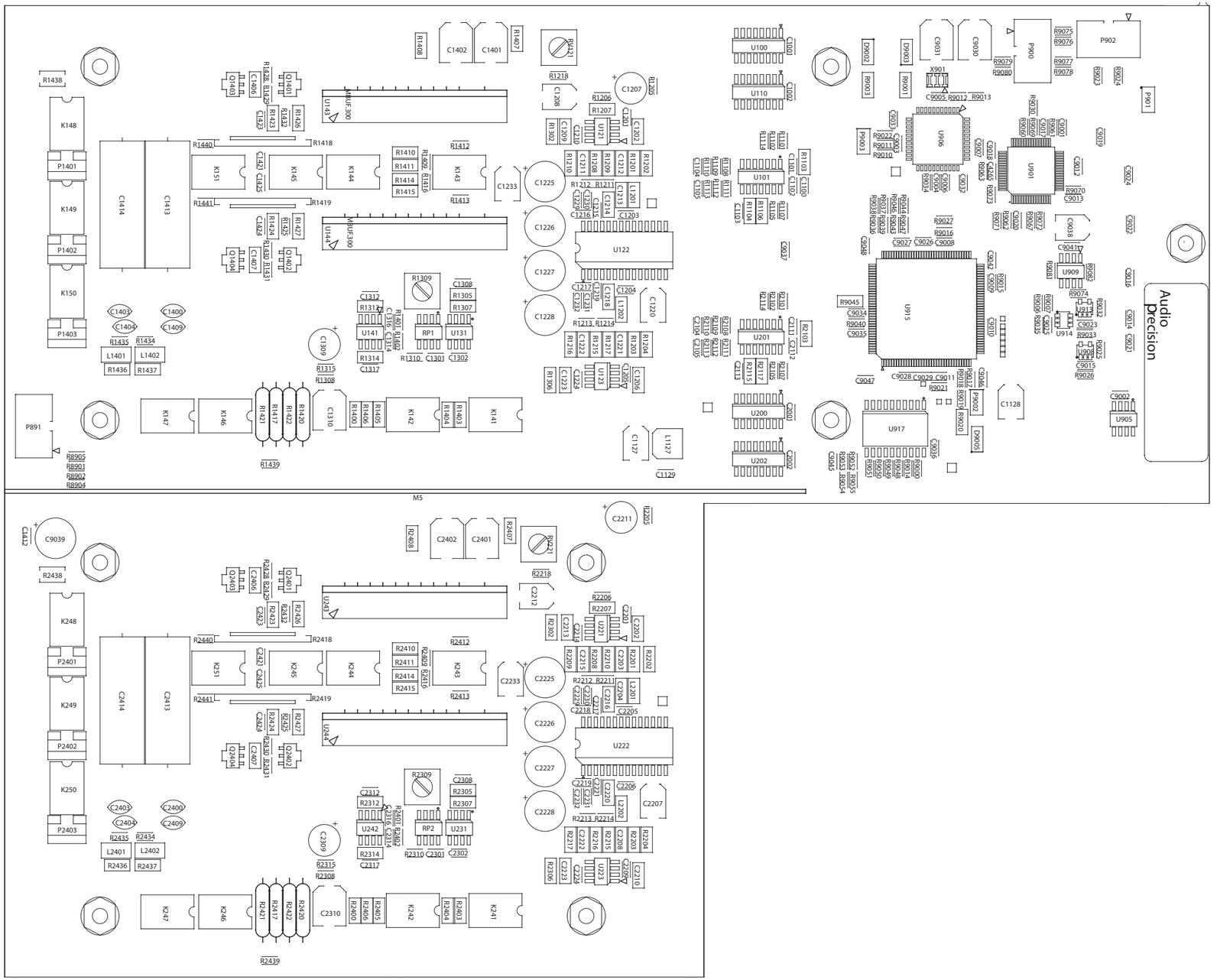

Figure 7-75 BOTA Analog Input Module (2-chan) (top) Rev 2

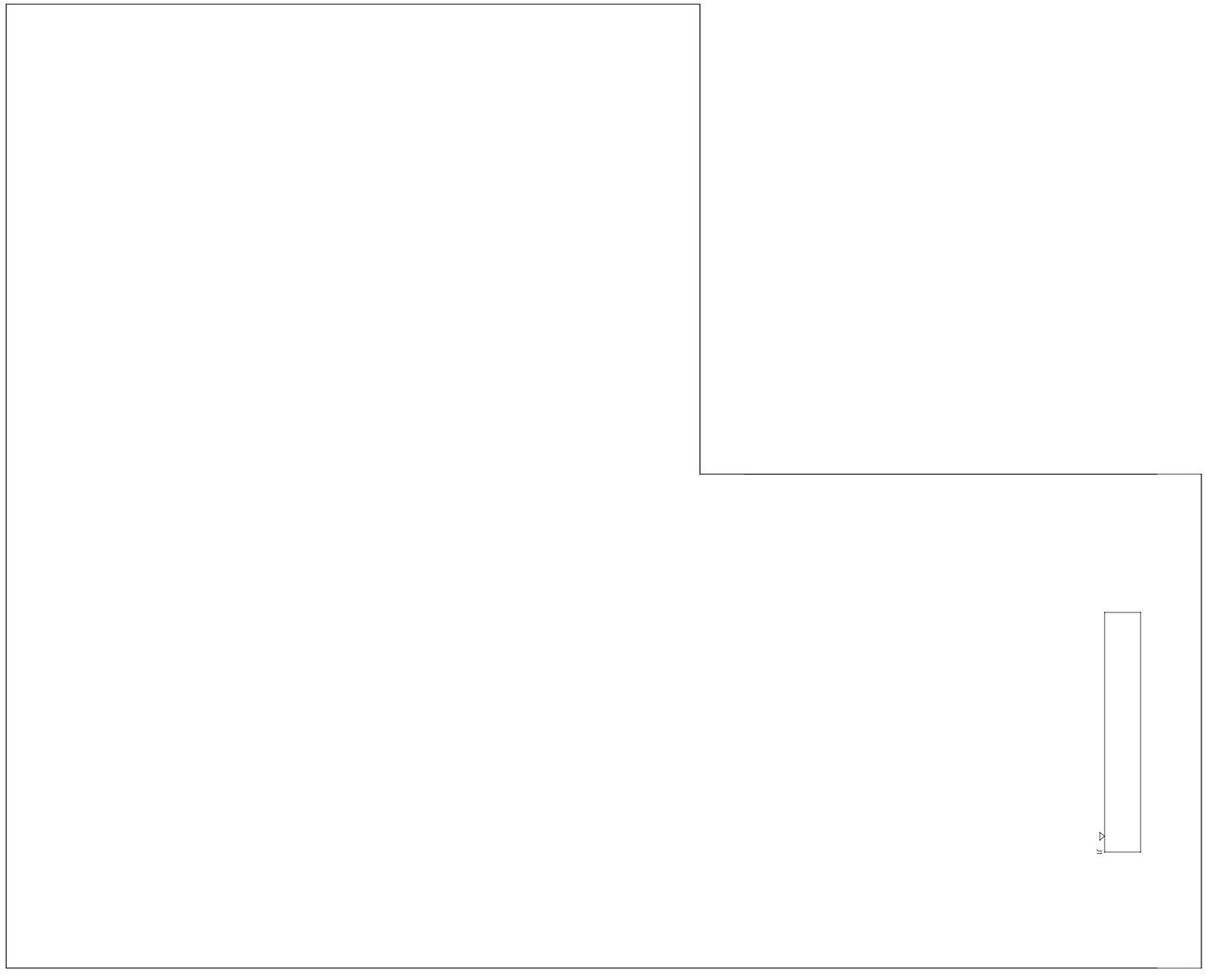

Figure 7-76 BOTA Analog Input Module (2-chan) (bot) Rev 2

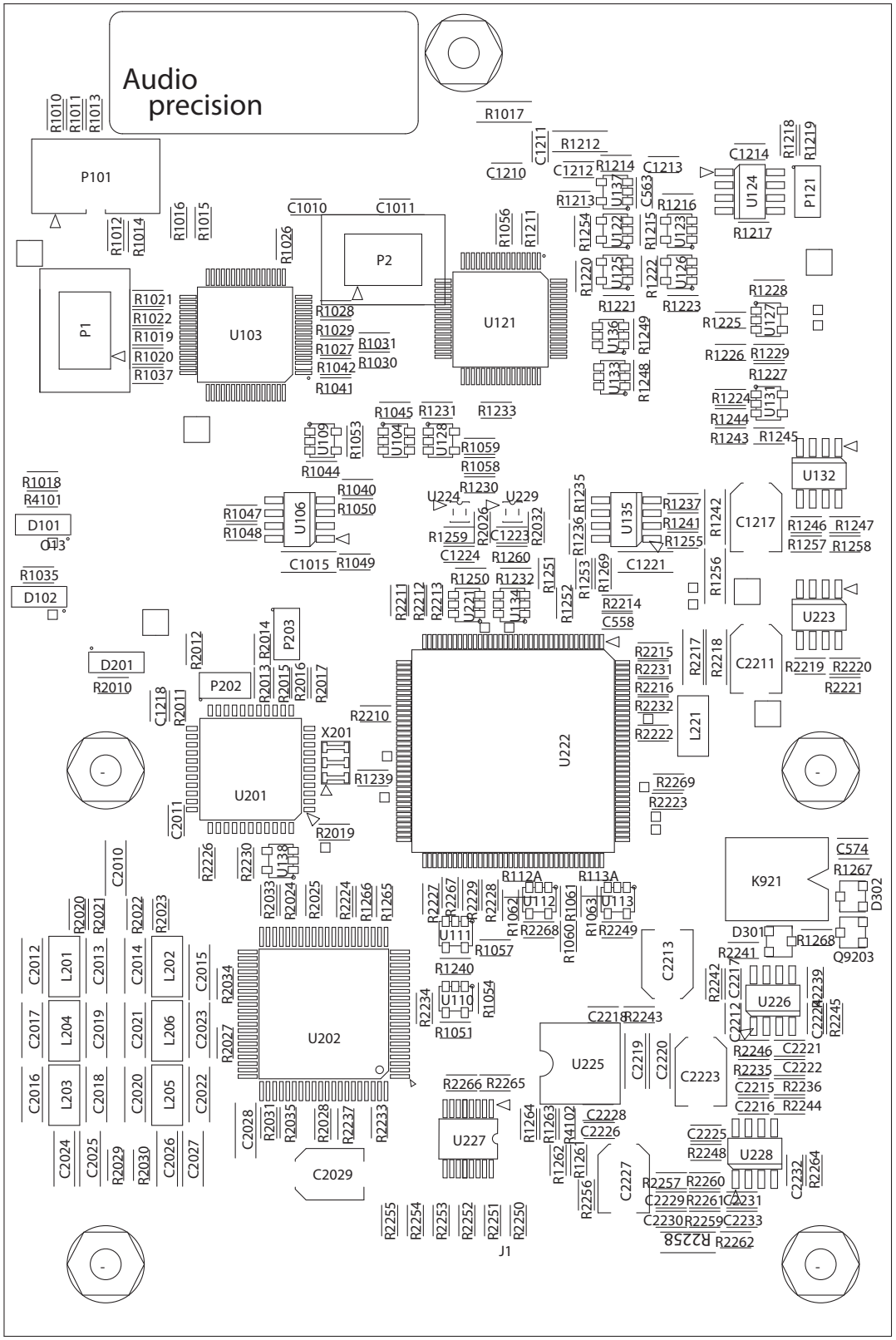

Figure 7-77 BPDM PDM I/O (top) Rev 0

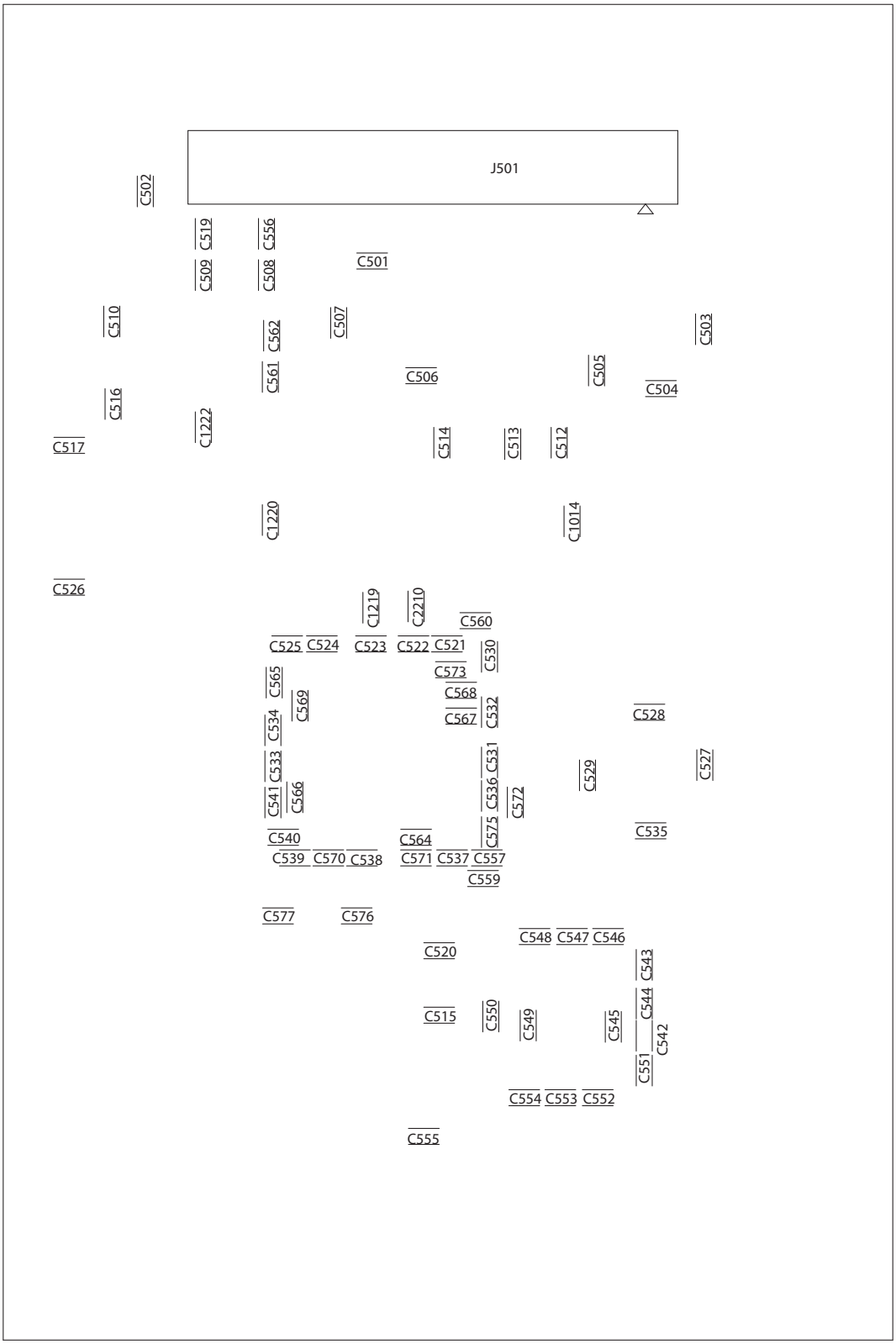

Figure 7-78 BPDM PDM I/O (bottom) Rev 0

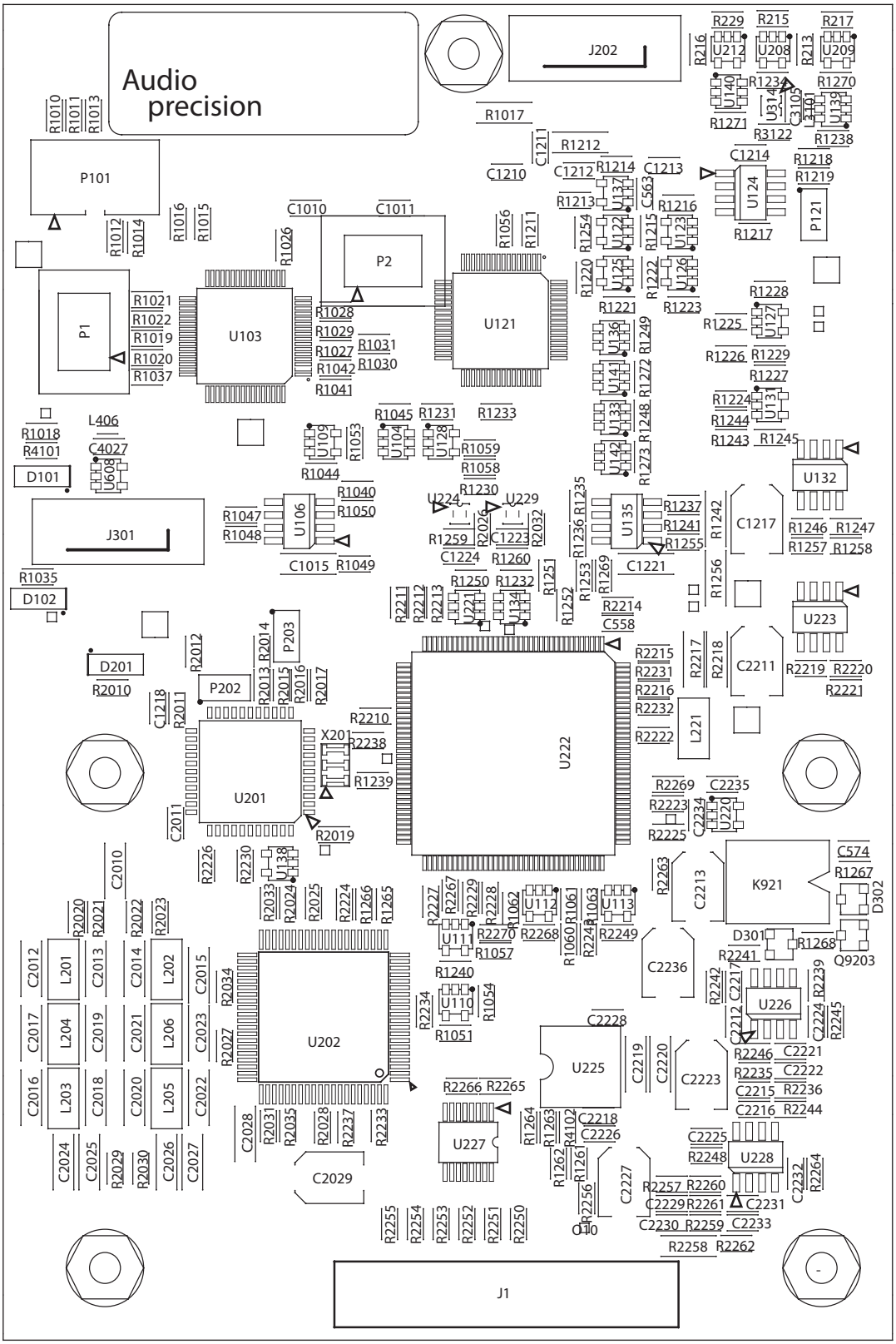

Figure 7-79 BPDM PDM I/O (top) Rev 1

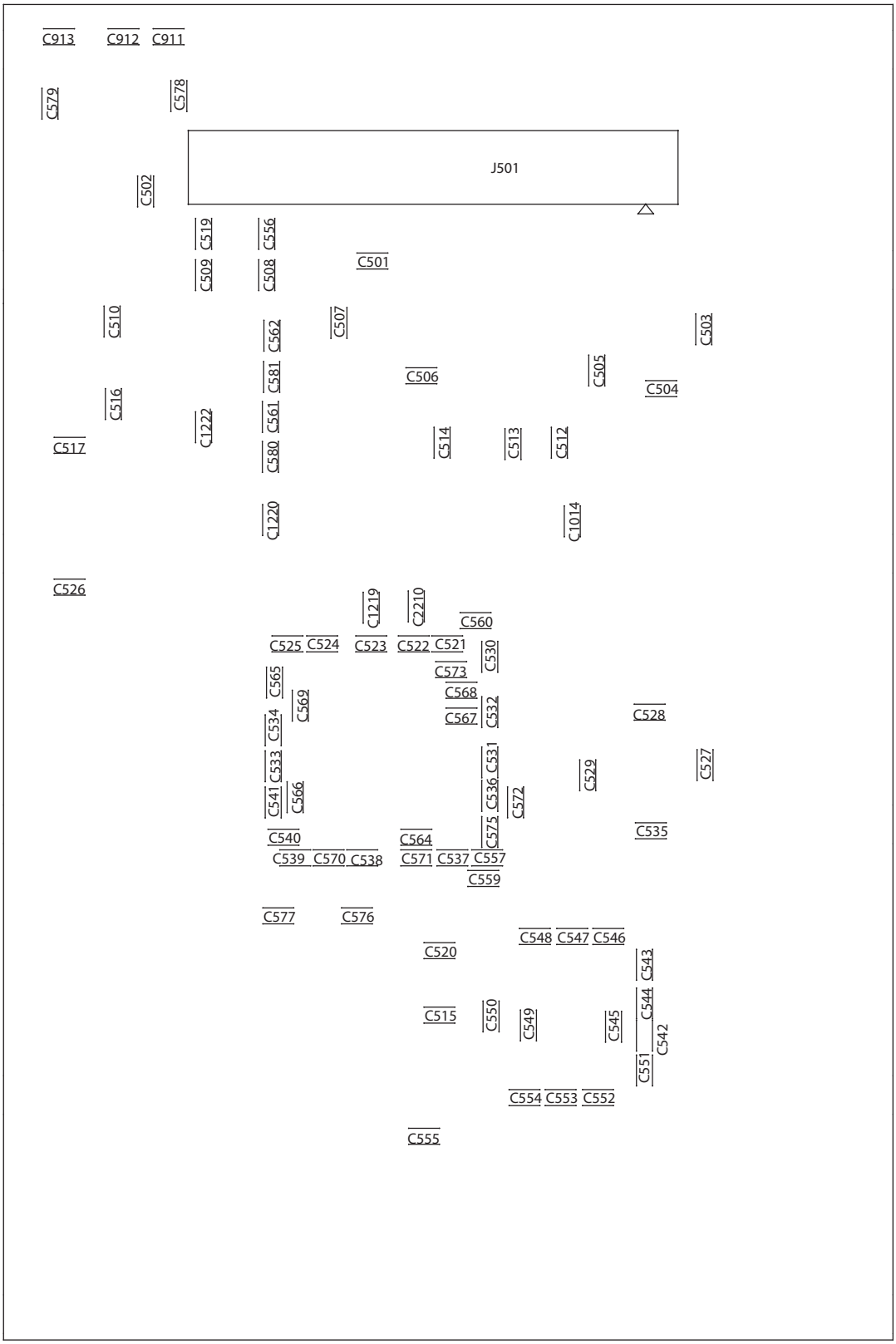

Figure 7-80 BPDM PDM I/O (bottom) Rev 1

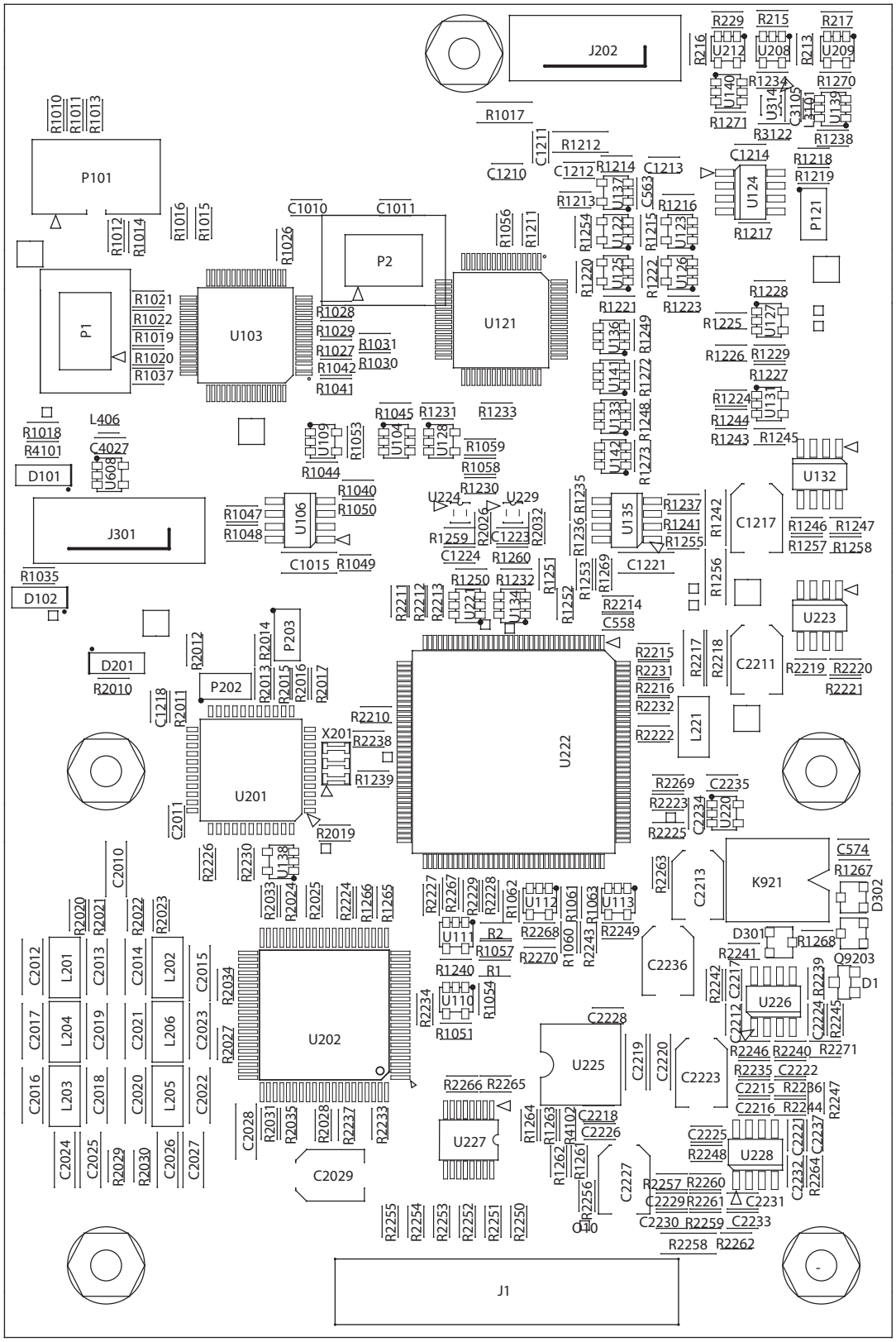

Figure 7-81 BPDM PDM I/O (top) Rev 2

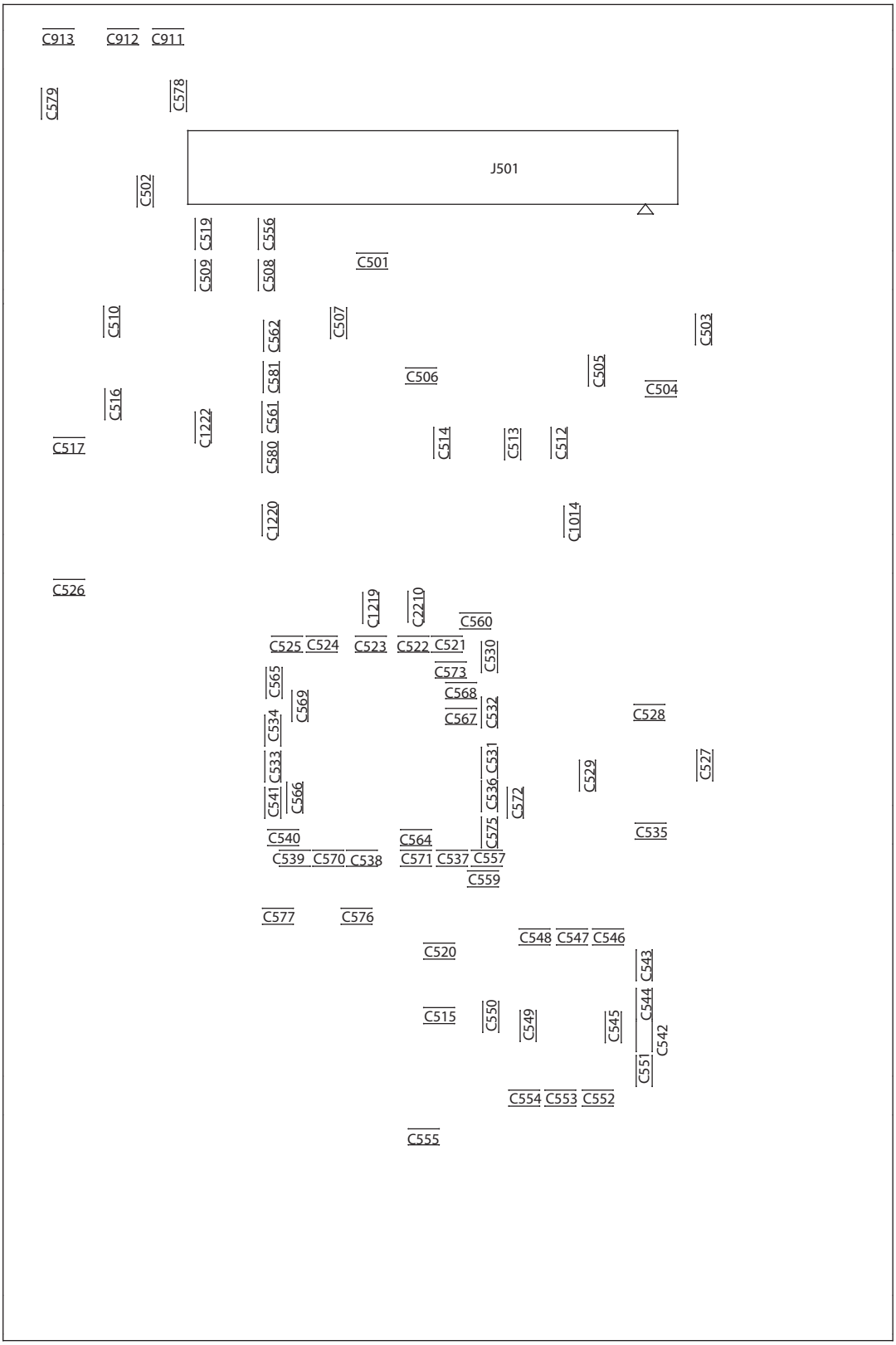

Figure 7-82 BPDM PDM I/O (bottom) Rev 2

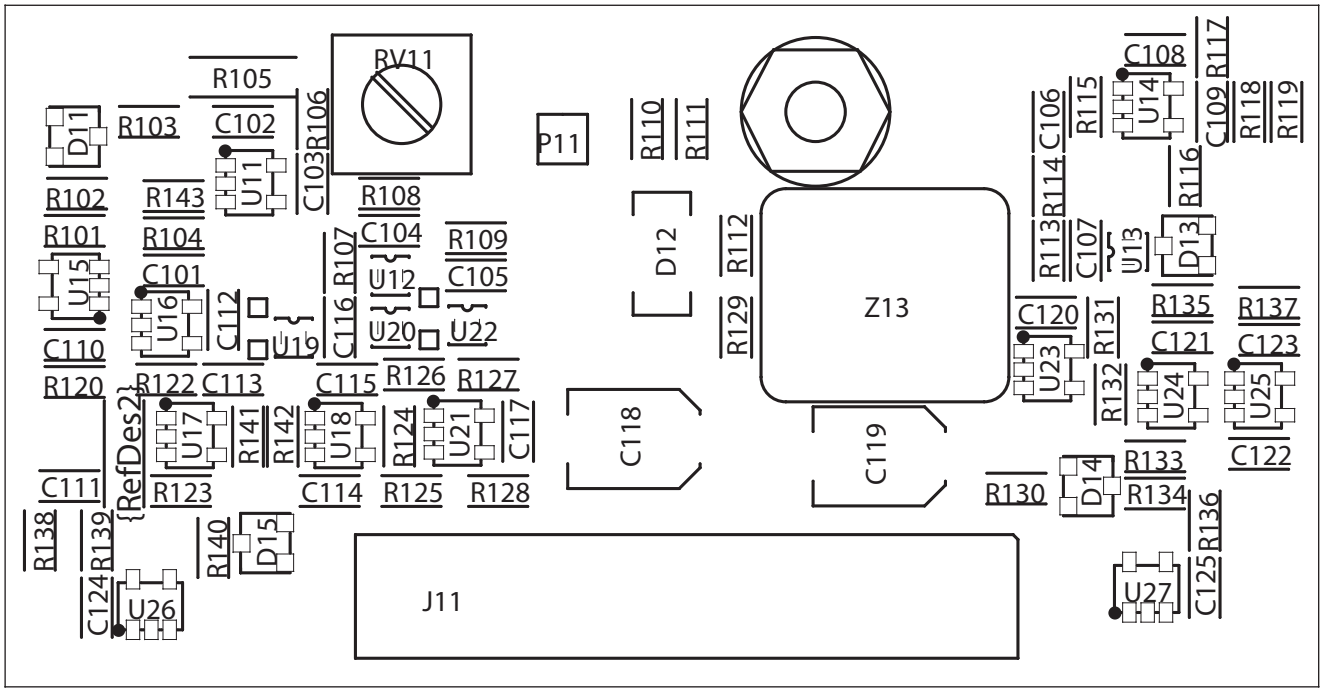

Figure 7-83 BPFP Front Panel (top) Rev 0

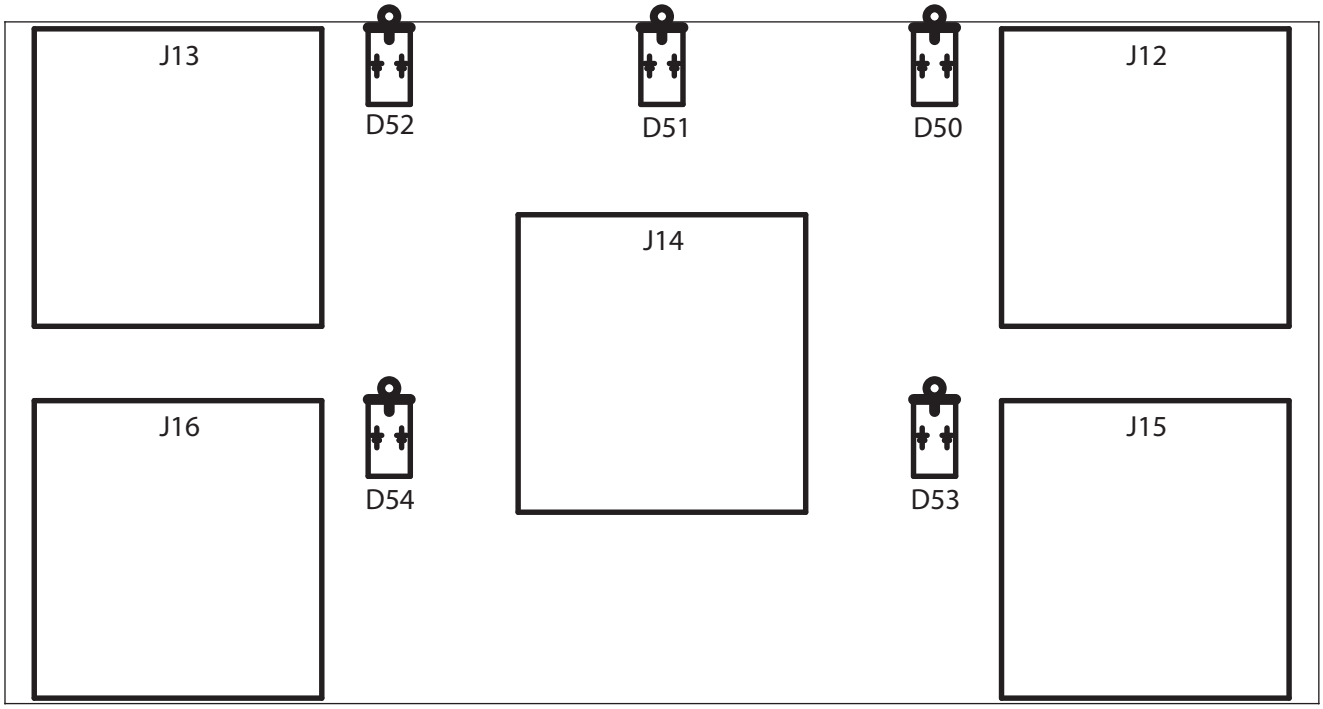

Figure 7-84 BPFP Front Panel (bottom) Rev 0

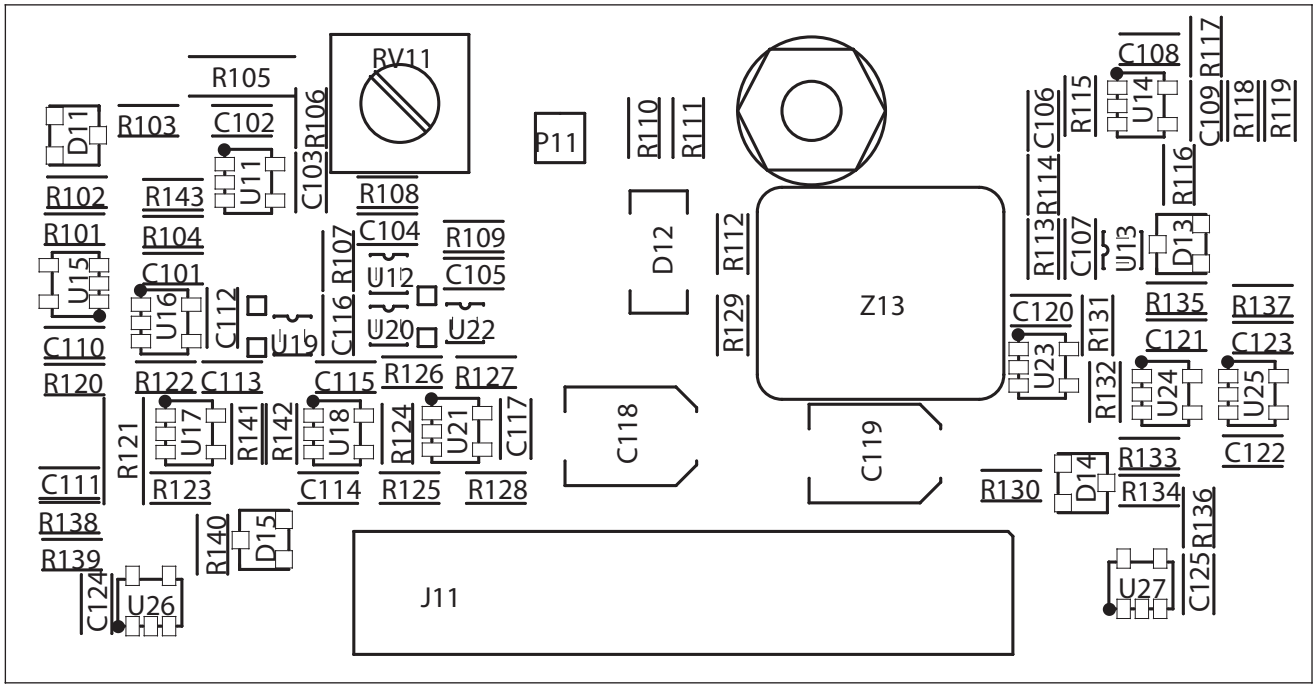

Figure 7-85 BPFP Front Panel (top) Rev 1

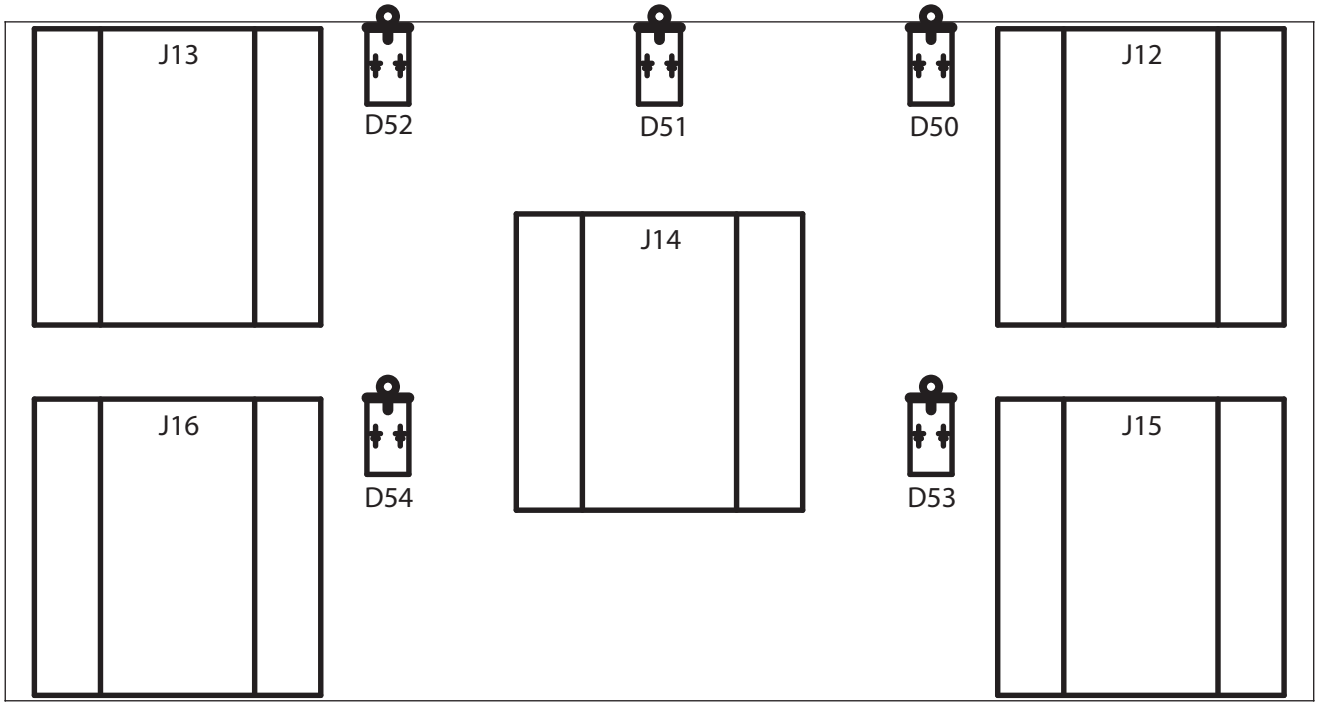

Figure 7-86 BPFP Front Panel (bottom) Rev 1

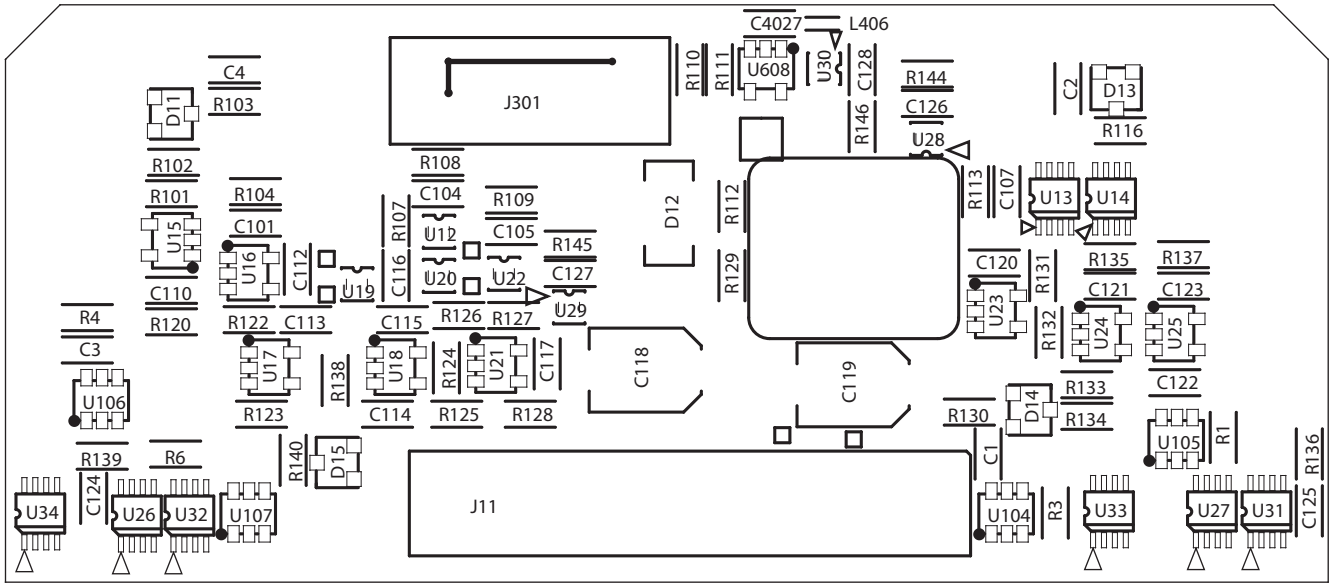

Figure 7-87 BPFP Front Panel (top) Rev 2

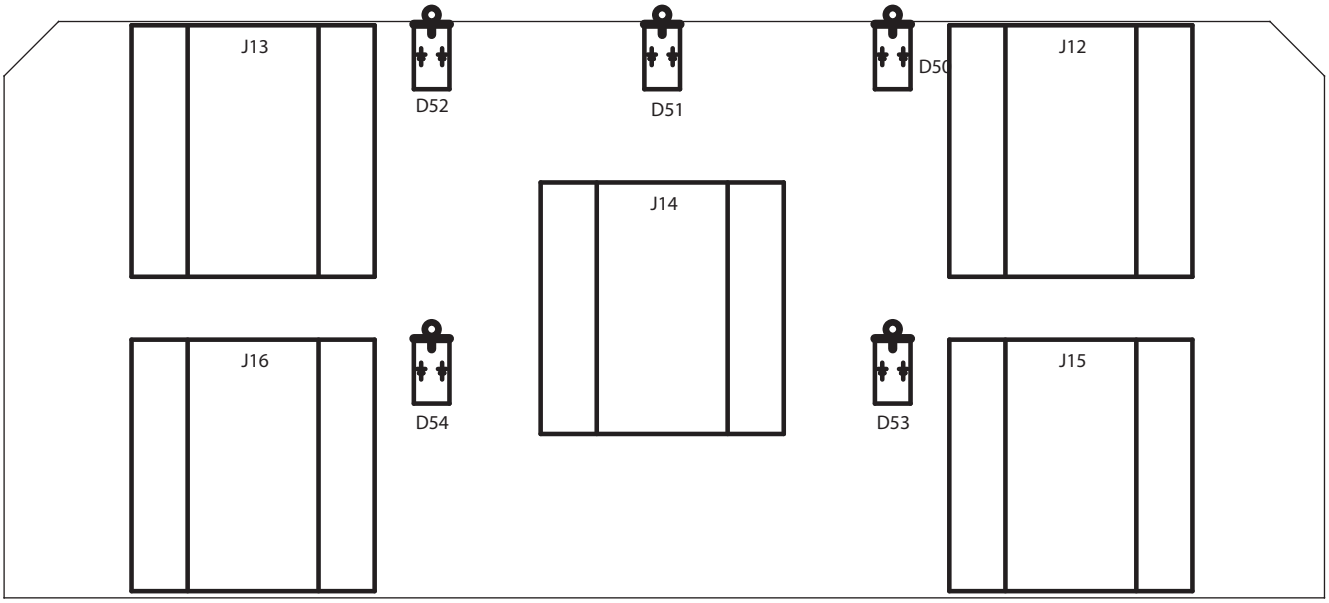

Figure 7-88 BPFP Front Panel (bottom) Rev 2

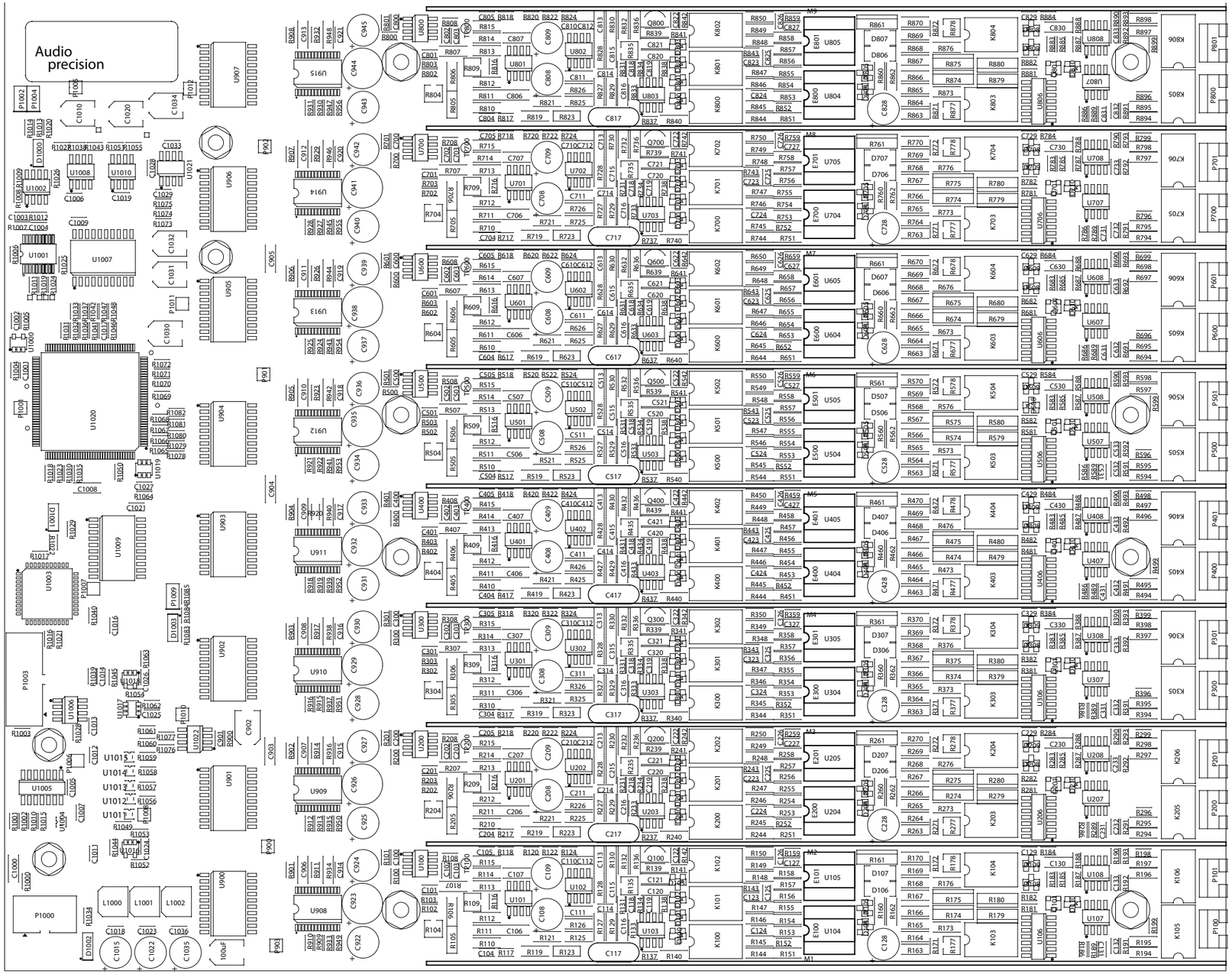

Figure 7-89 BPLX Analog Output Module (8-chan) (top) Rev 0

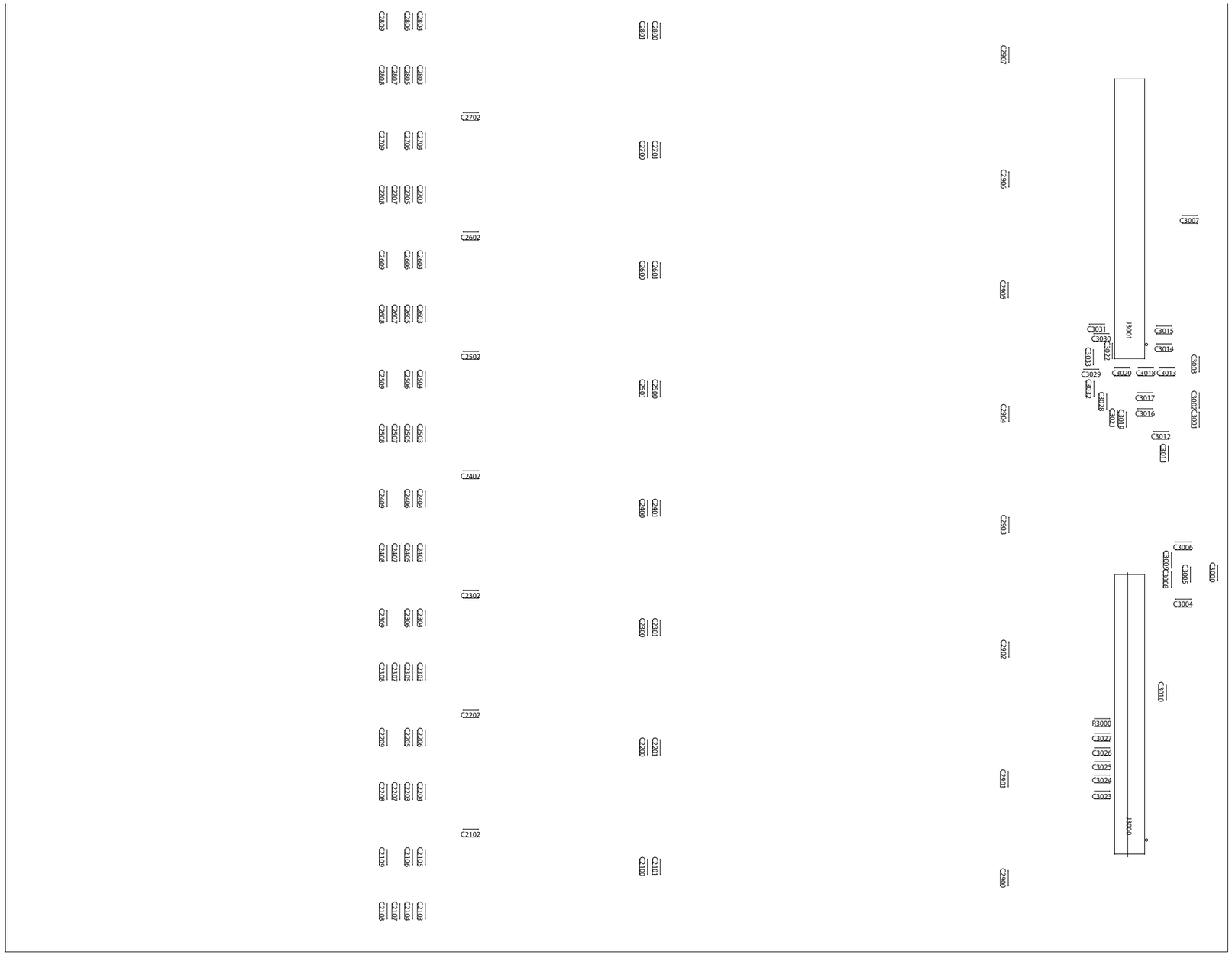

Figure 7-90 BPLX Analog Output Module (8-chan) (bottom) Rev 0

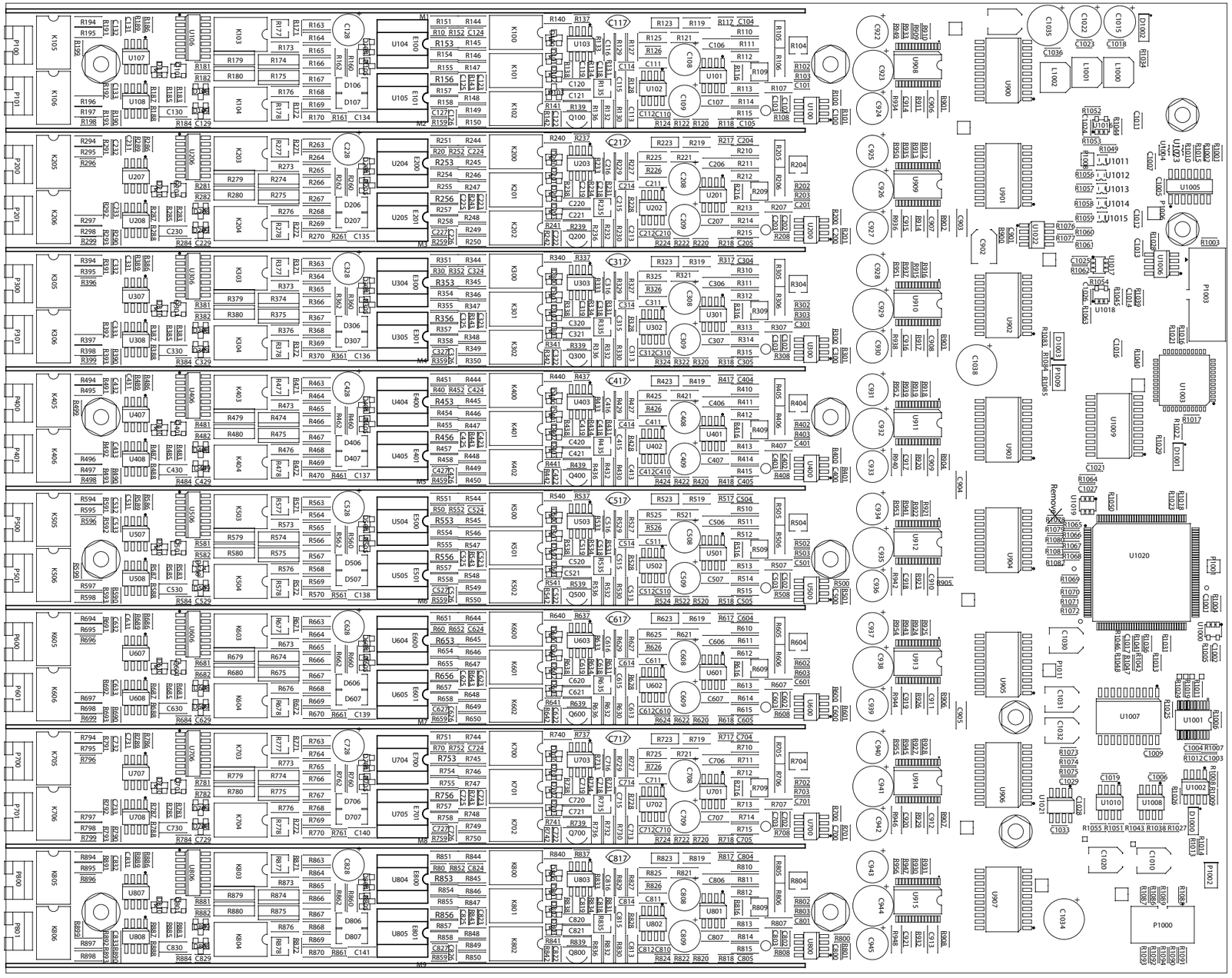

Figure 7-91 BPLX Analog Output Module (8-chan) (top) Rev 1

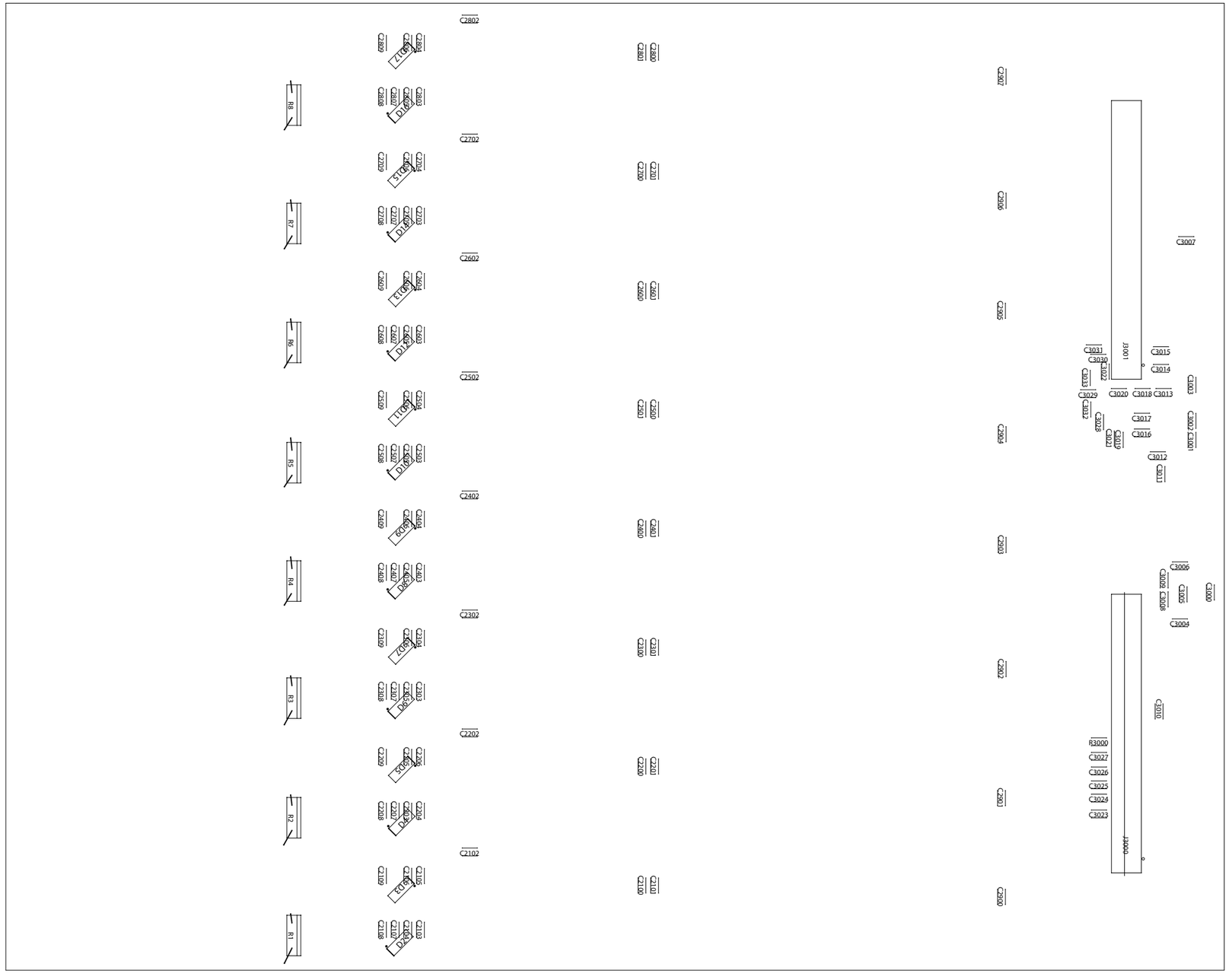

Figure 7-92 BPLX Analog Output Module (8-chan) (bottom) Rev 1

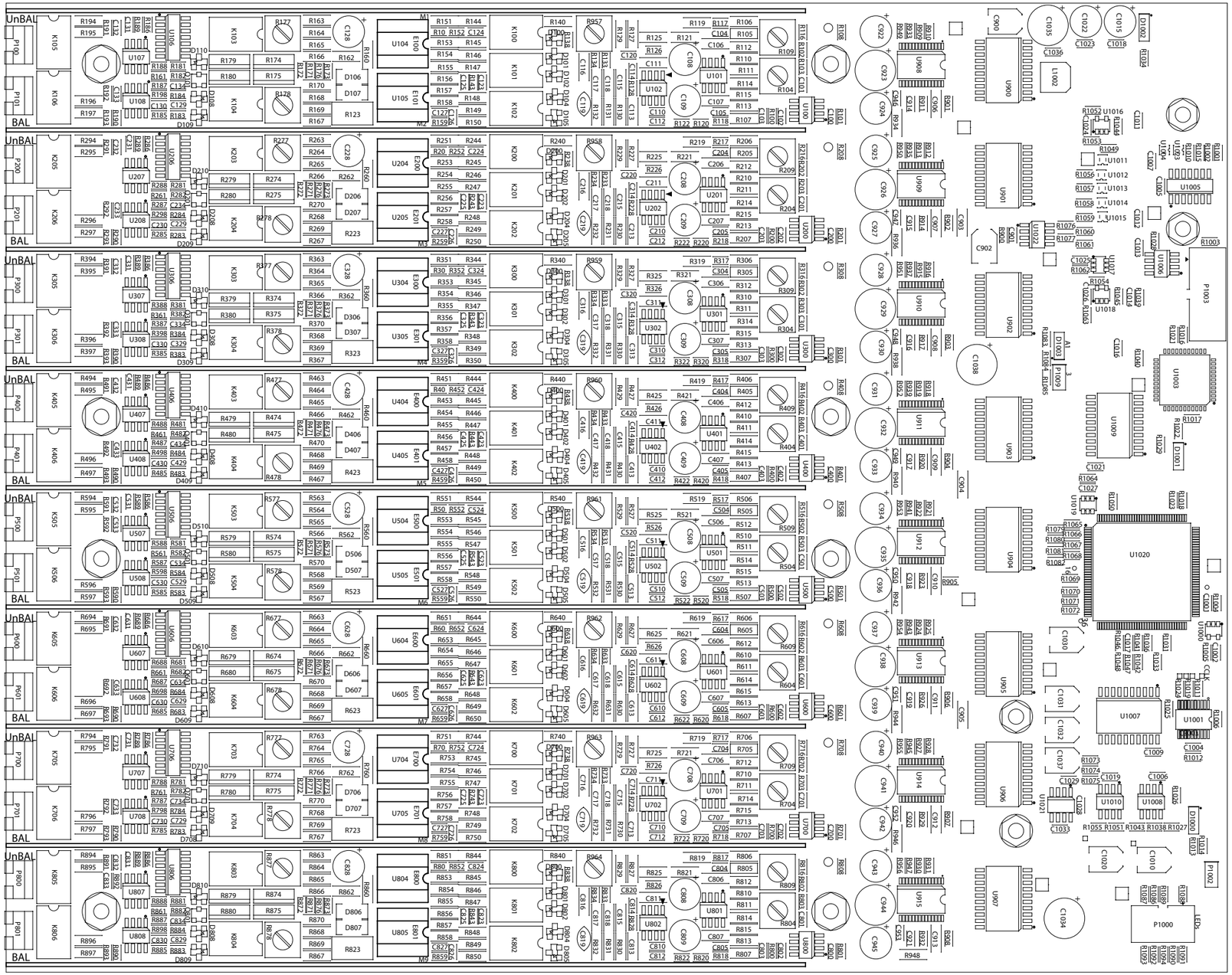

Figure 7-93 BPLX Analog Output Module (8-chan) (top) Rev 3

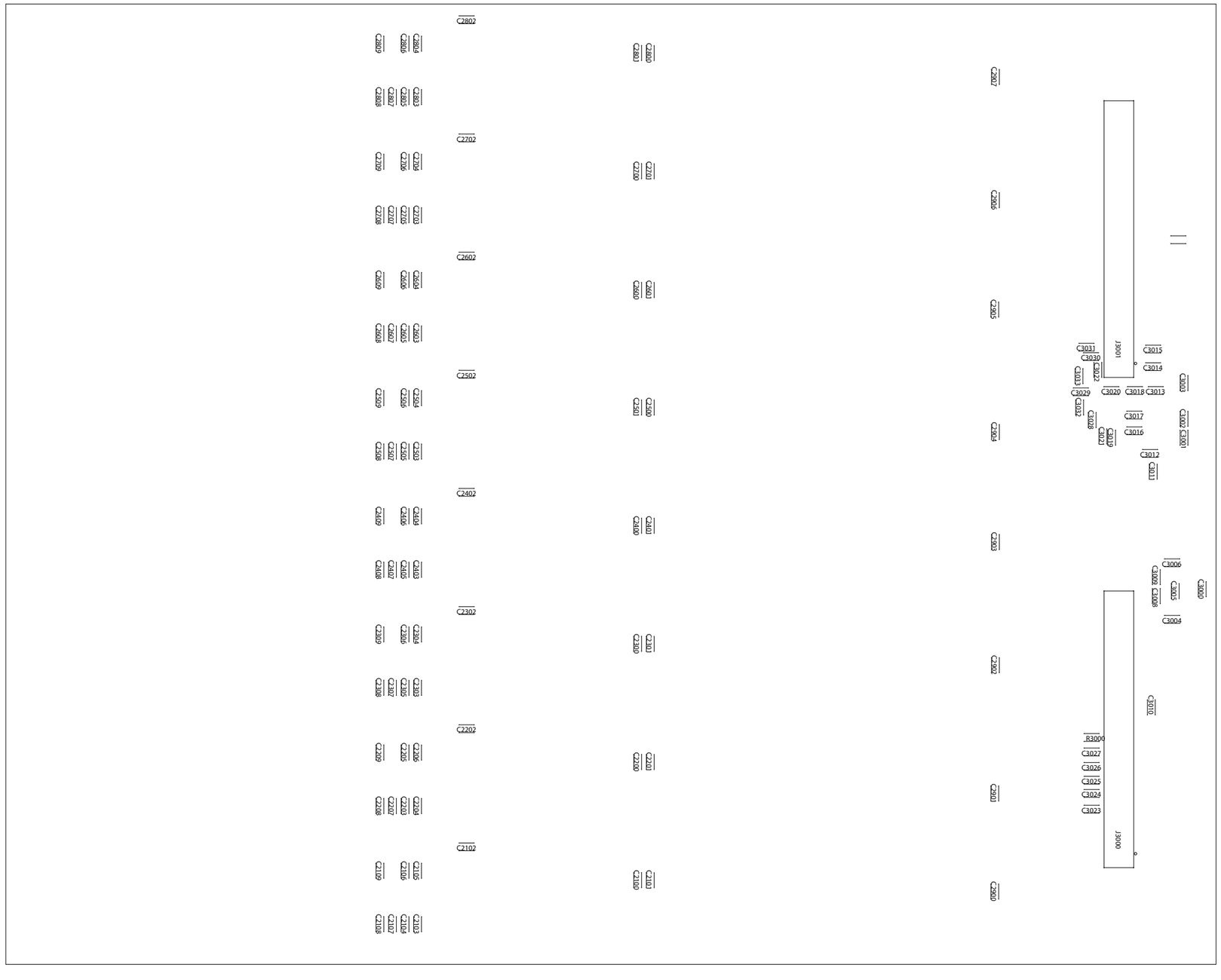

Figure 7-94 BPLX Analog Output Module (8-chan) (bottom) Rev 3

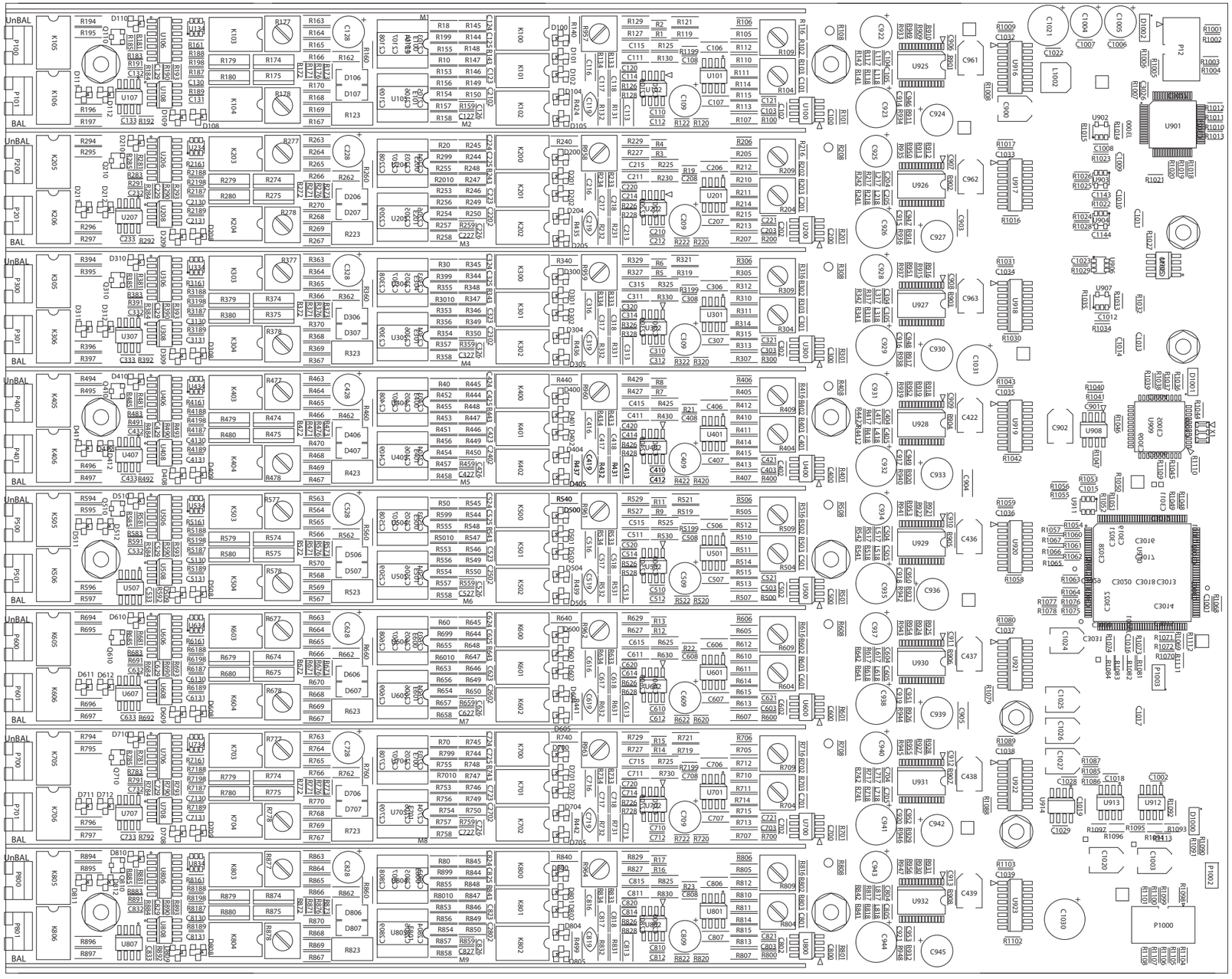

Figure 7-95 BPLX Analog Output Module (8-chan) (top) Rev 4

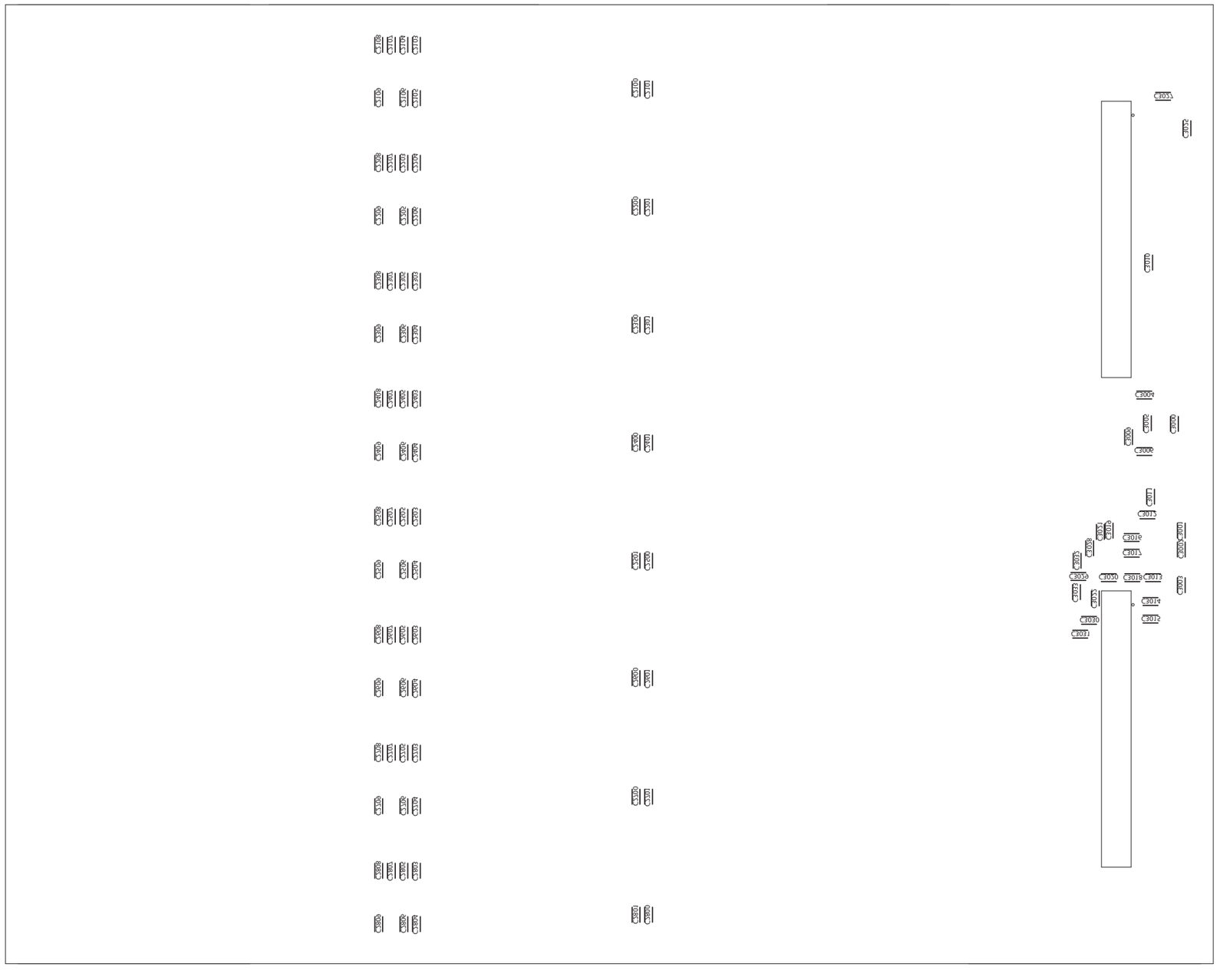

Figure 7-96 BPLX Analog Output Module (8-chan) (bottom) Rev 4

Figure 7-97 BPLX Analog Output Module (8-chan) (top) Rev 5

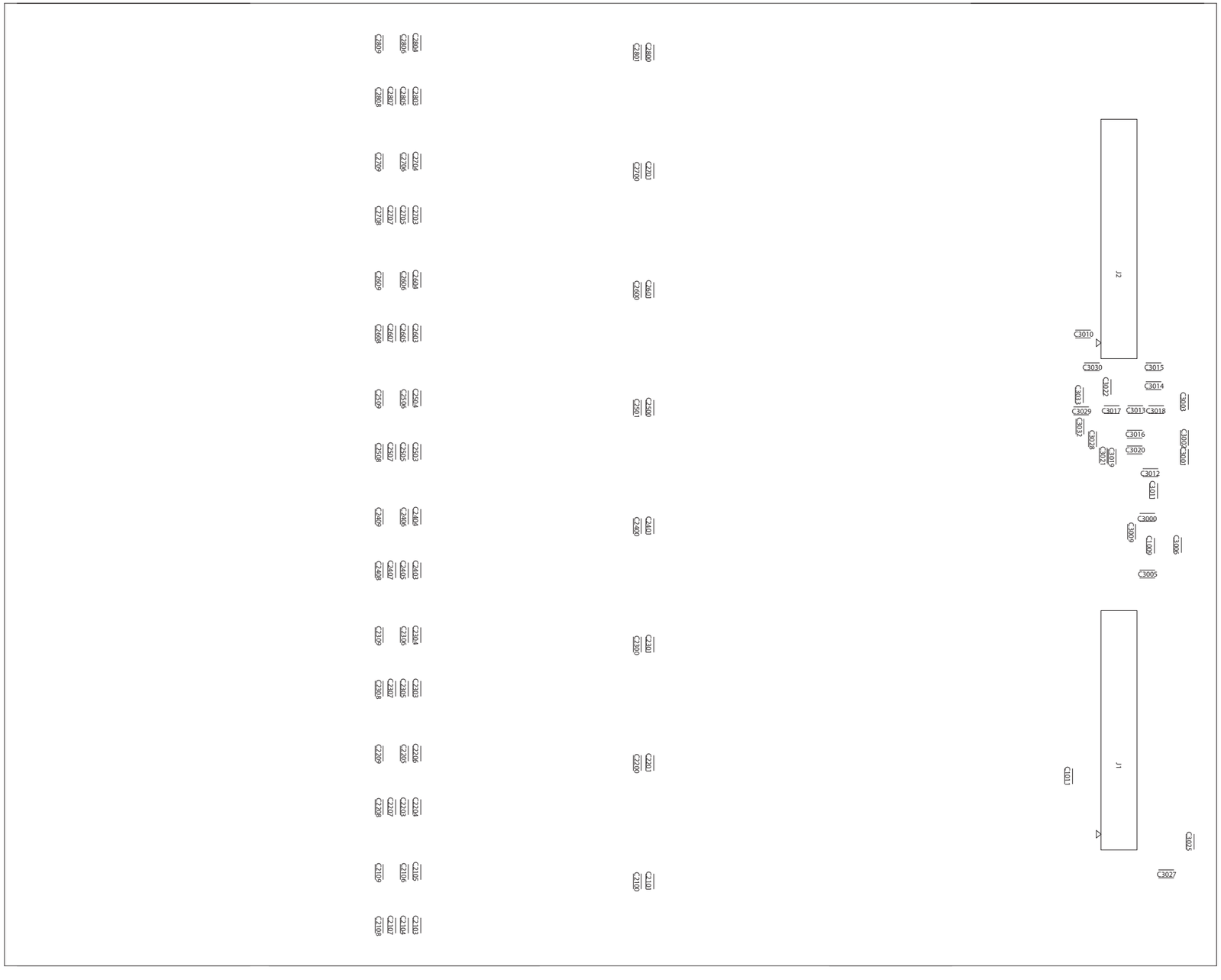

Figure 7-98 BPLX Analog Output Module (8-chan) (bottom) Rev 5

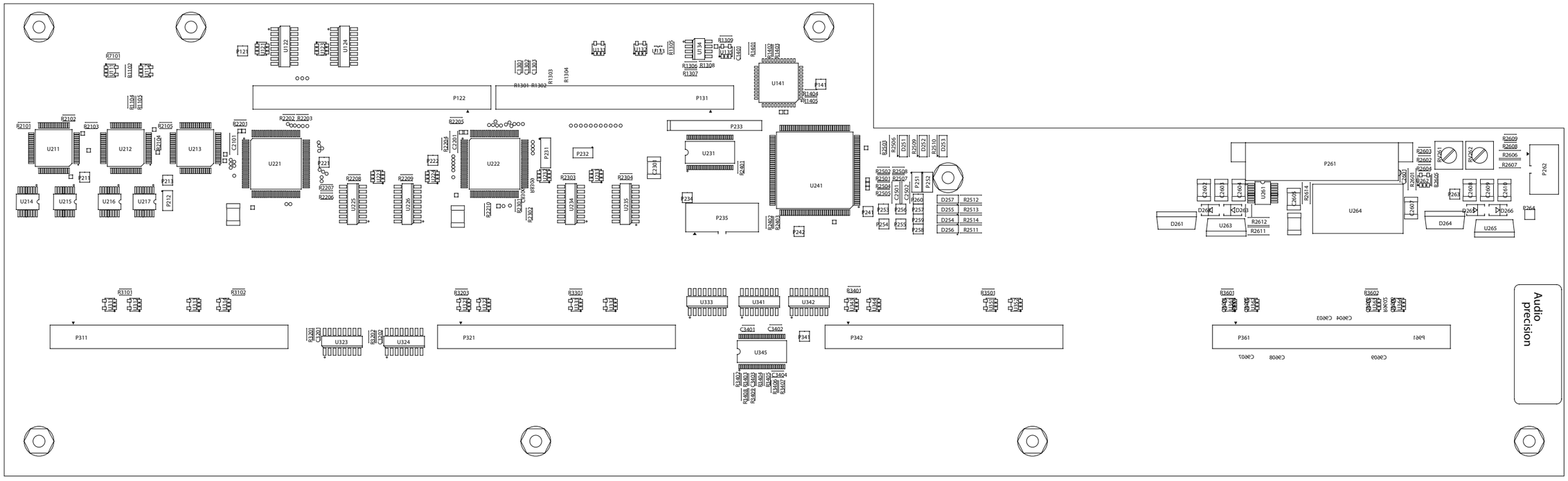

Figure 7-99 BRIO Distribution Module (top) Rev 0

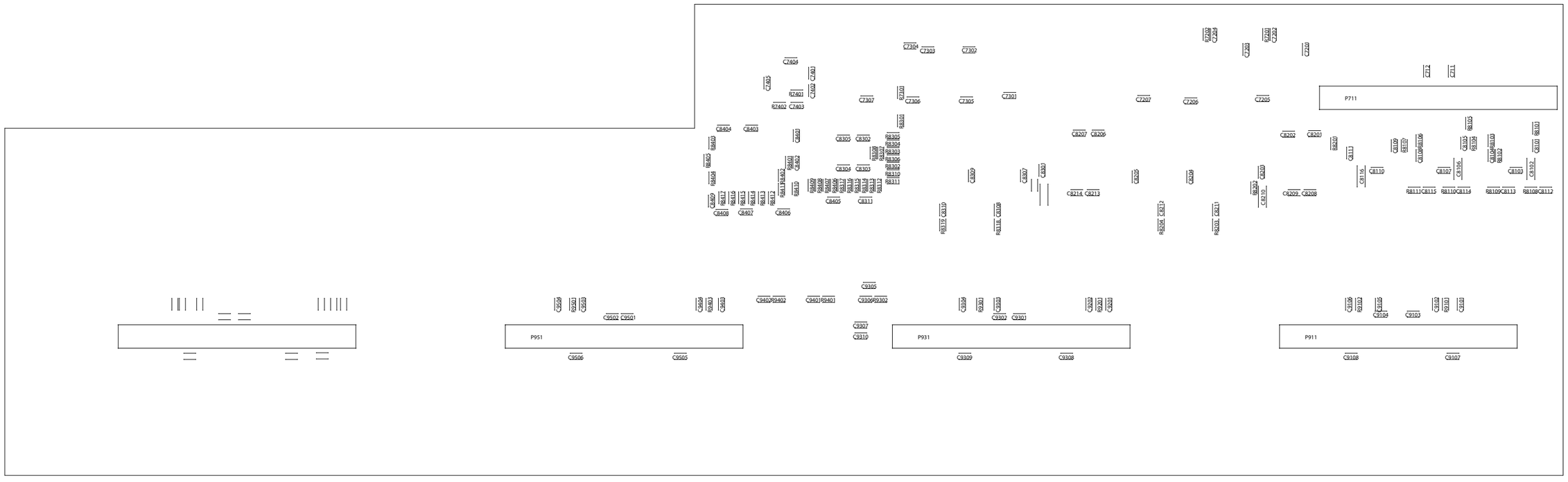

Figure 7-100 BRIO Distribution Module (bottom) Rev 0

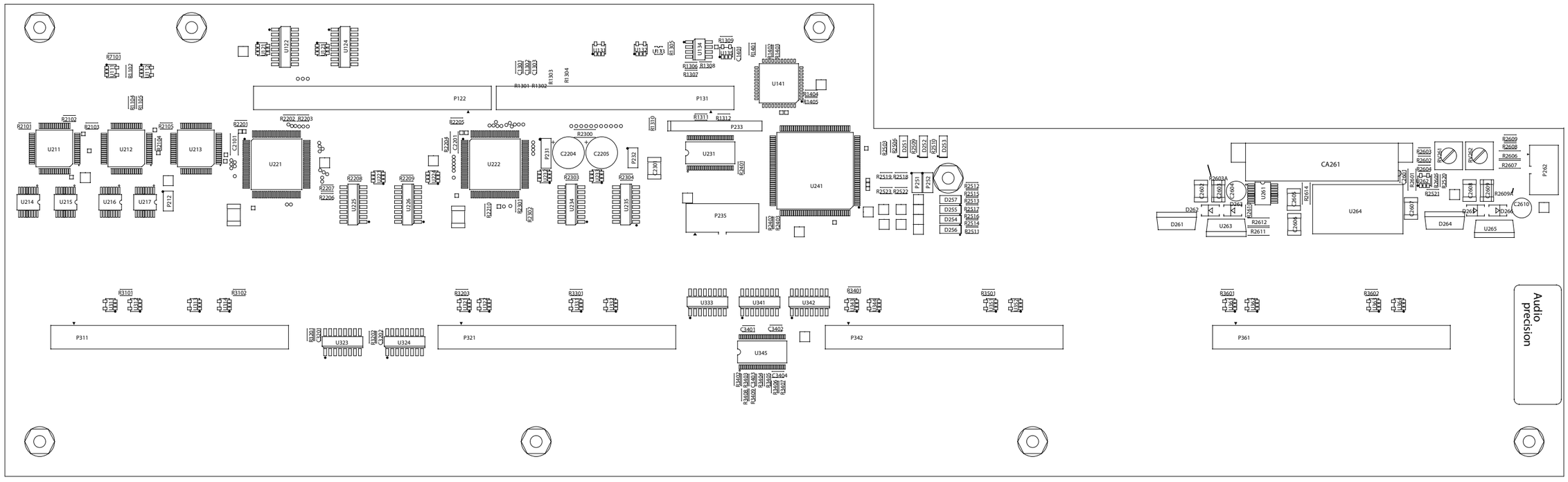

Figure 7-101 BRIO Distribution Module (top) Rev 1

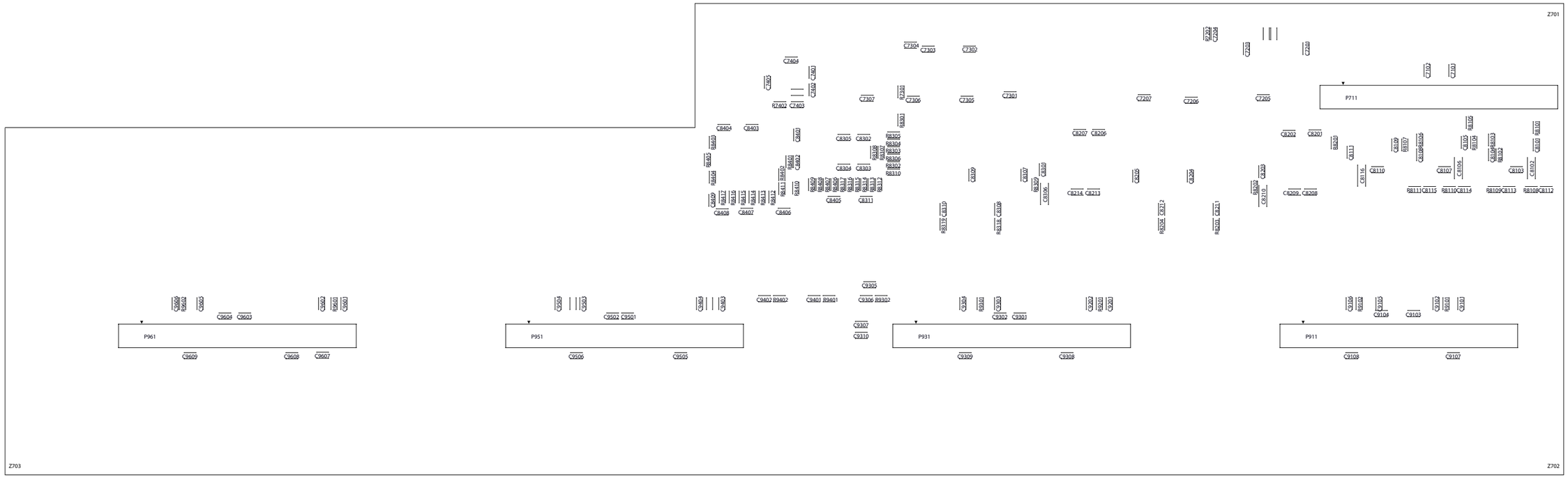

Figure 7-102 BRIO Distribution Module (bottom) Rev 1

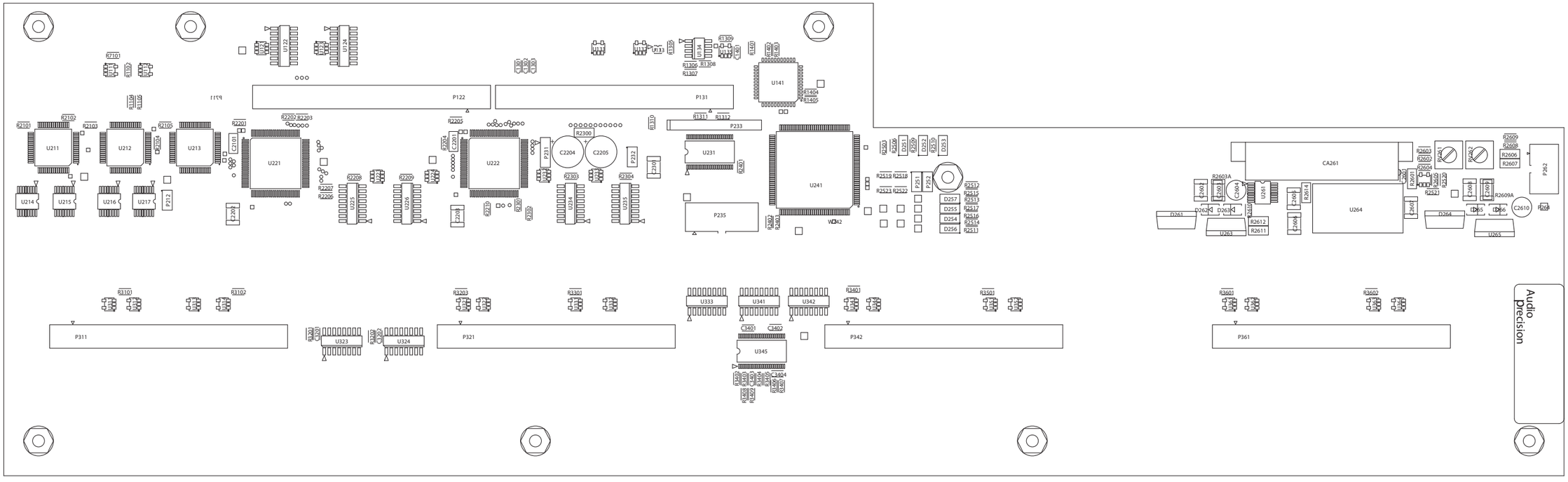

Figure 7-103 BRIO Distribution Module (top) Rev 2

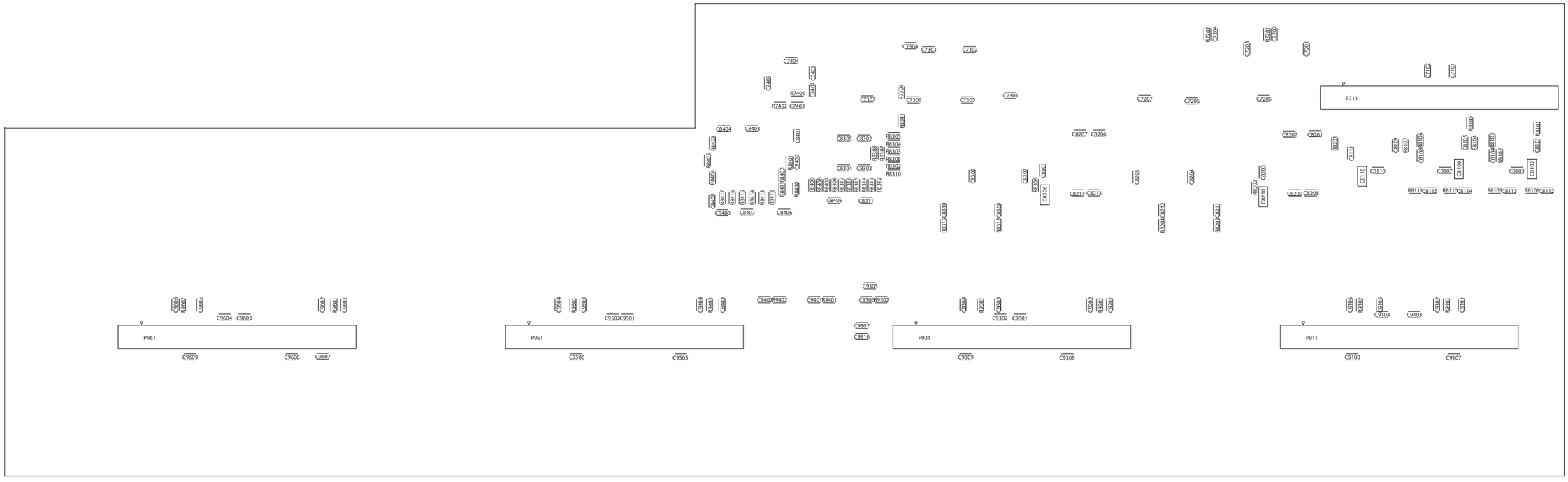

Figure 7-104 BRIO Distribution Module (bottom) Rev 2

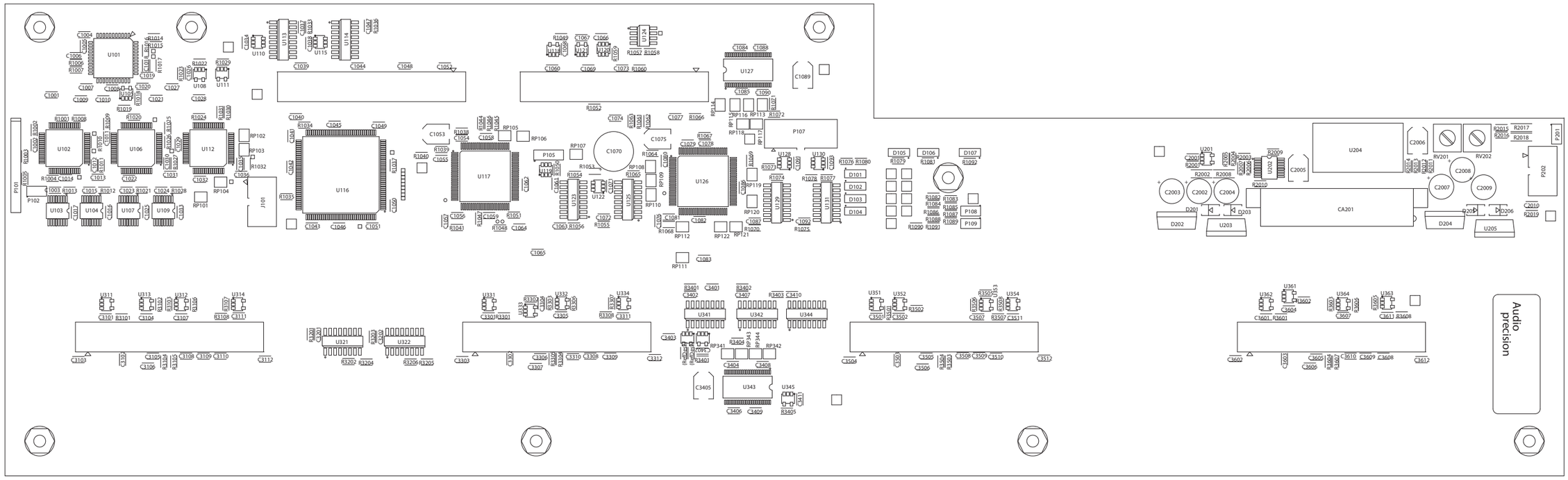

Figure 7-105 BRIO Distribution Module (top) Rev 3

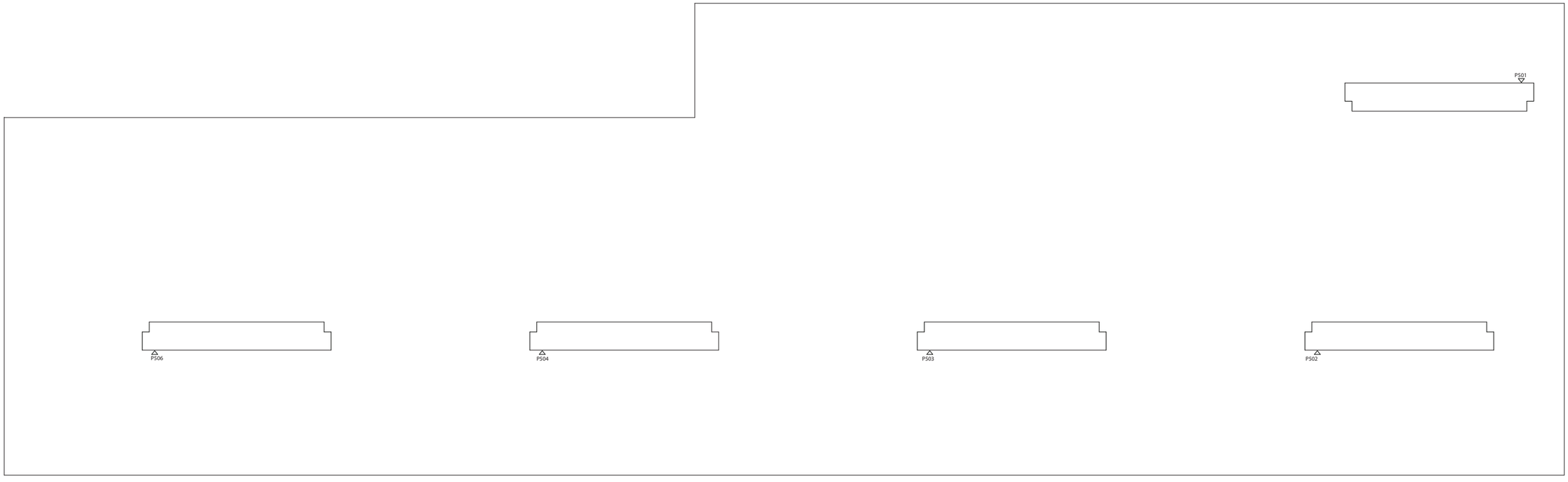

Figure 7-106 BRIO Distribution Module (bottom) Rev 3

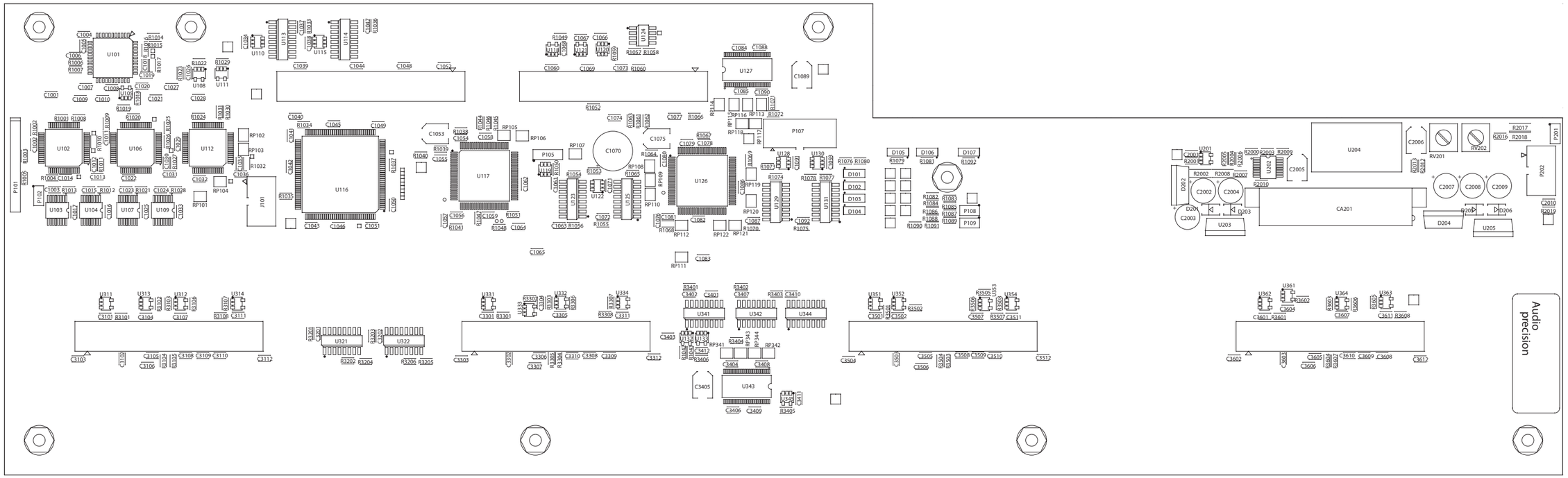

Figure 7-107 BRIO Distribution Module (top) Rev 4

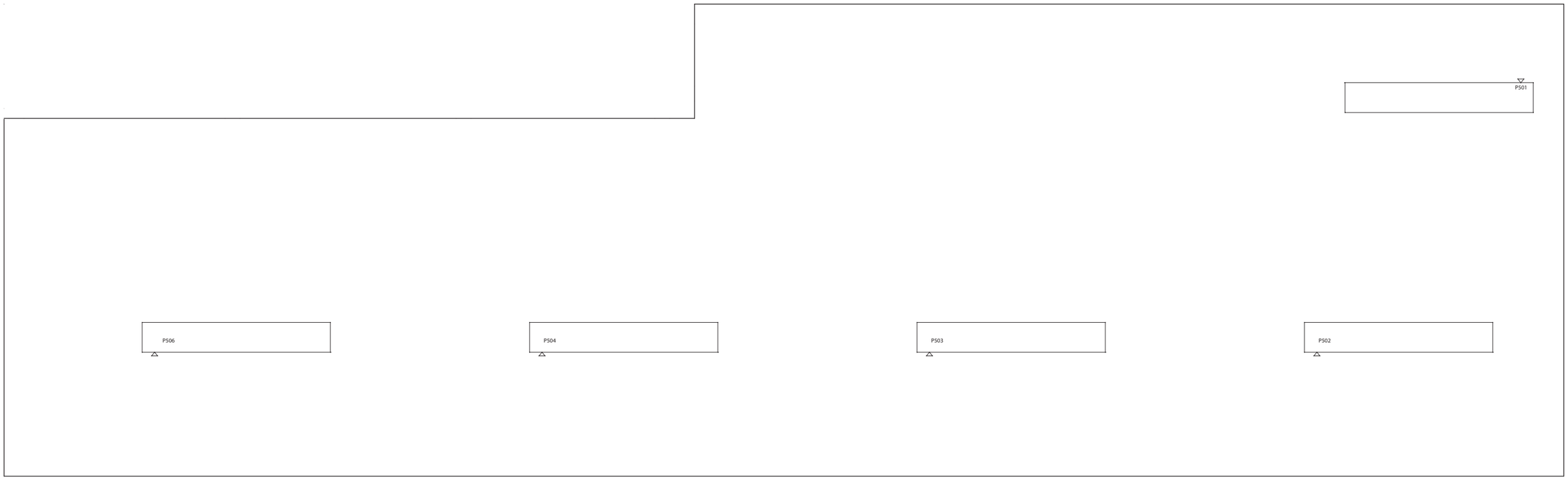

Figure 7-108 BRIO Distribution Module (bottom) Rev 4

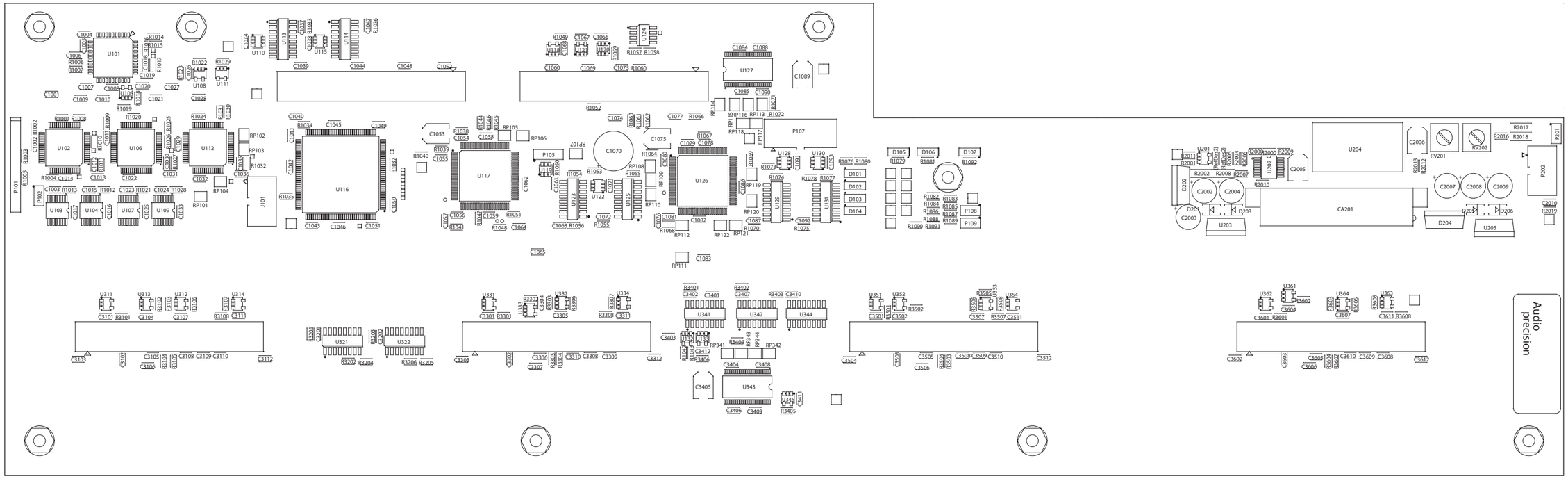

Figure 7-109 BRIO Distribution Module (top) Rev 5

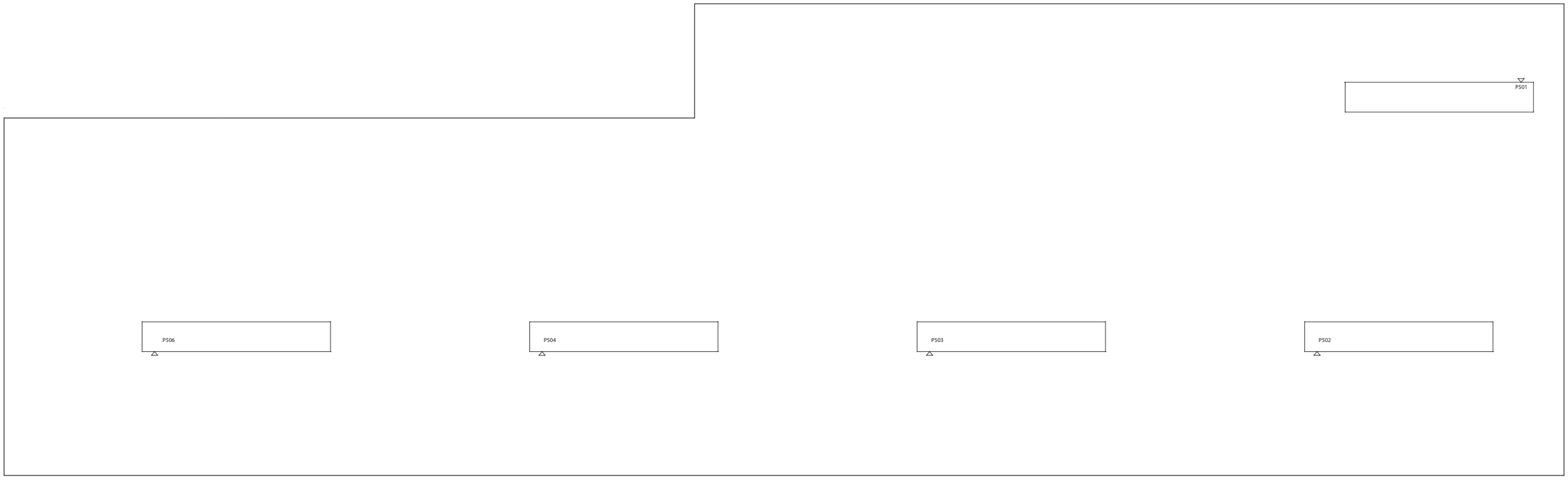

Figure 7-110 BRIO Distribution Module (bottom) Rev 5

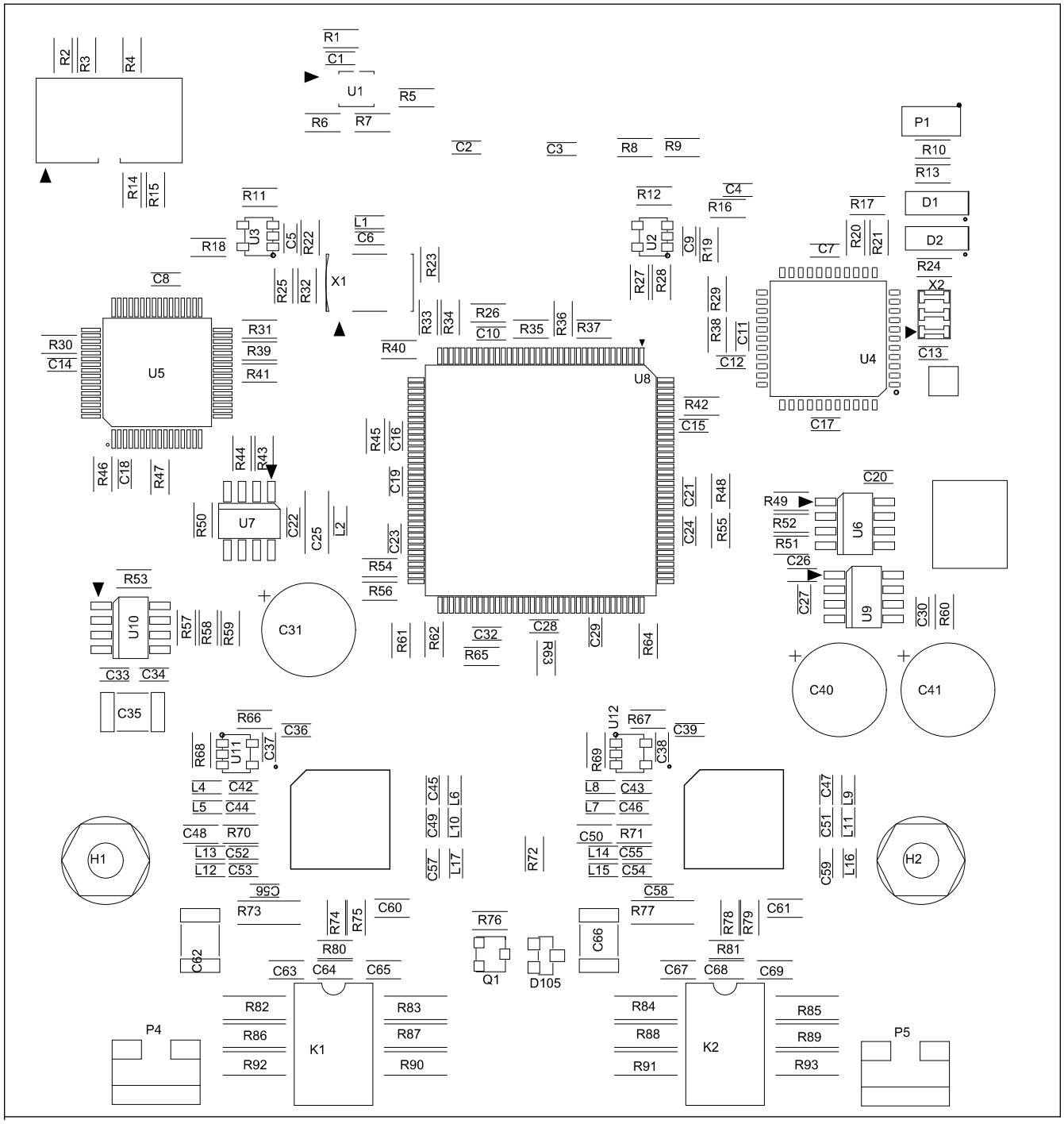

Figure 7-111 BROT BW52 Ultra-high Bandwidth Option Module (top) Rev 0

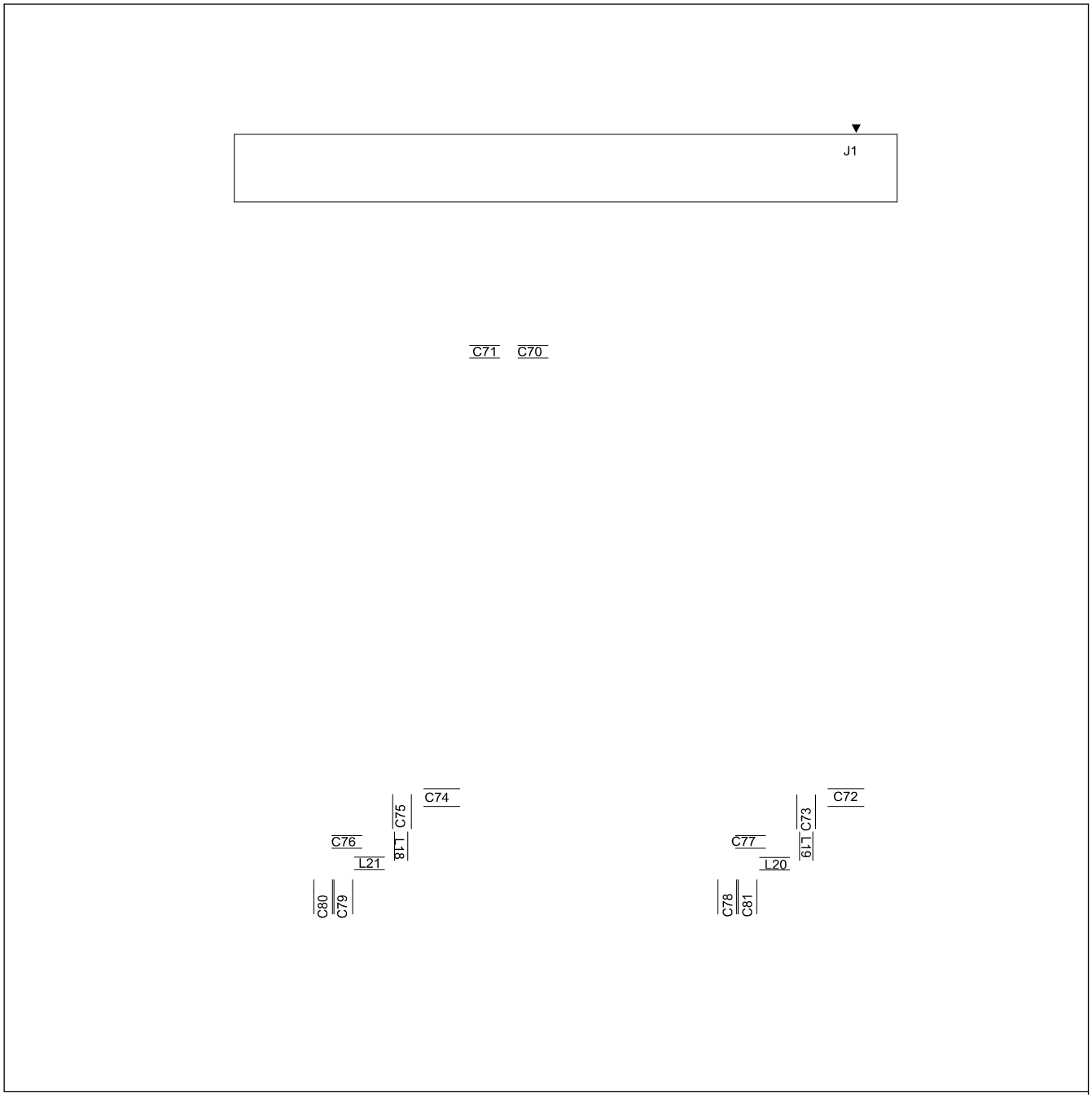

Figure 7-112 BROT BW52 Ultra-high Bandwidth Option Module (bottom) Rev 0

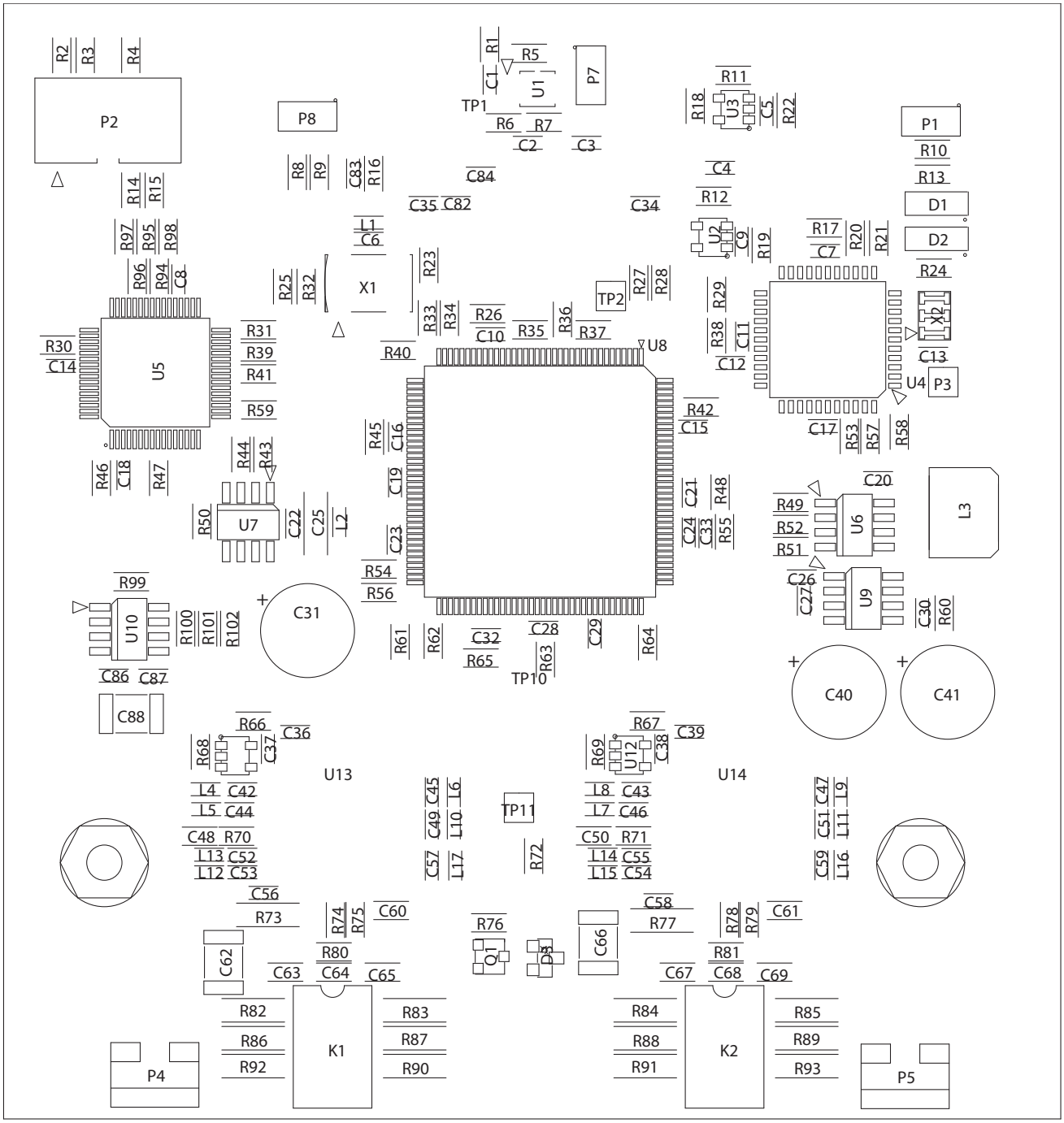

Figure 7-113 BROT BW52 Ultra-high Bandwidth Option Module (top) Rev 1

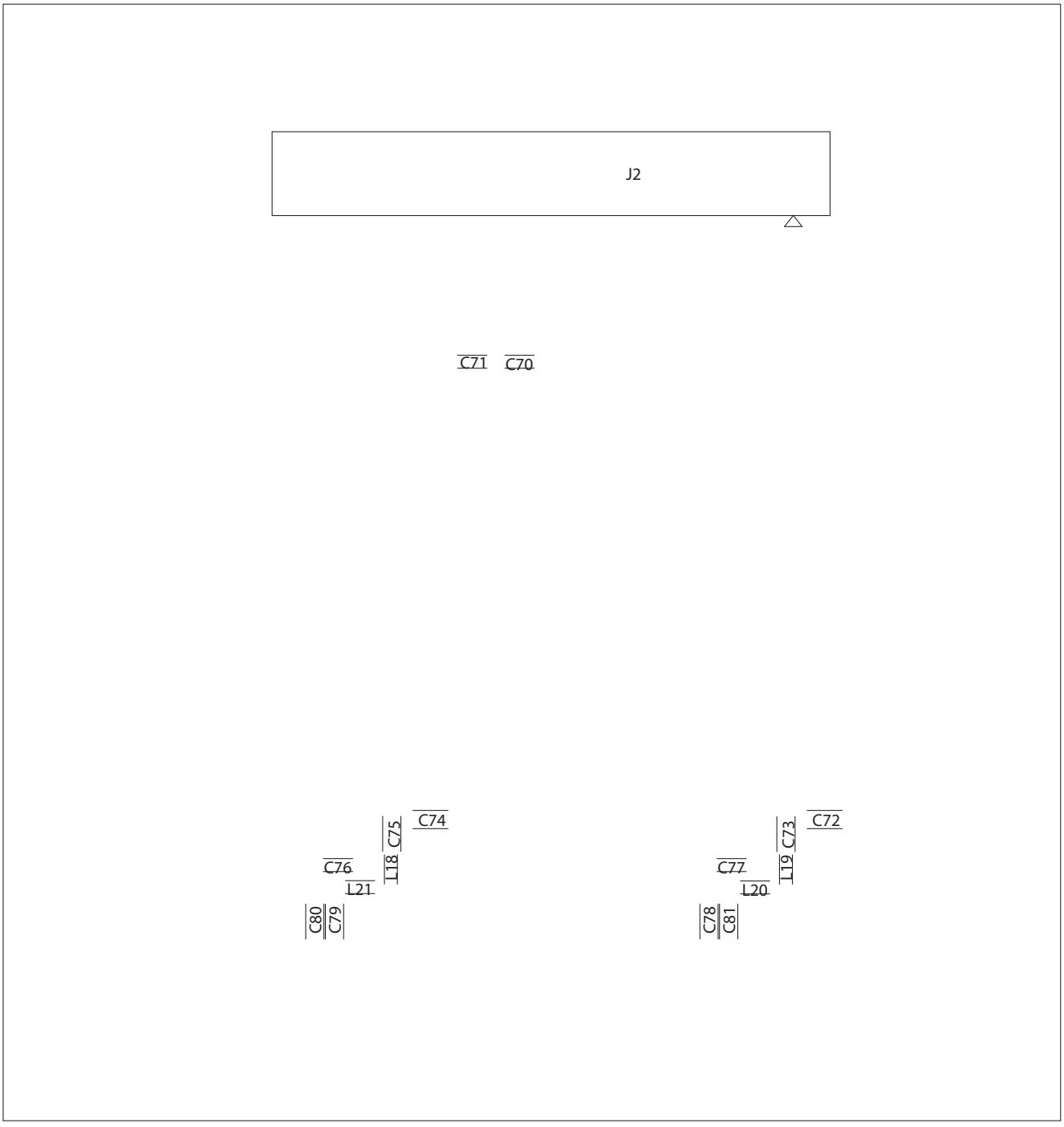

Figure 7-114 BROT BW52 Ultra-high Bandwidth Option Module (bottom) Rev 1

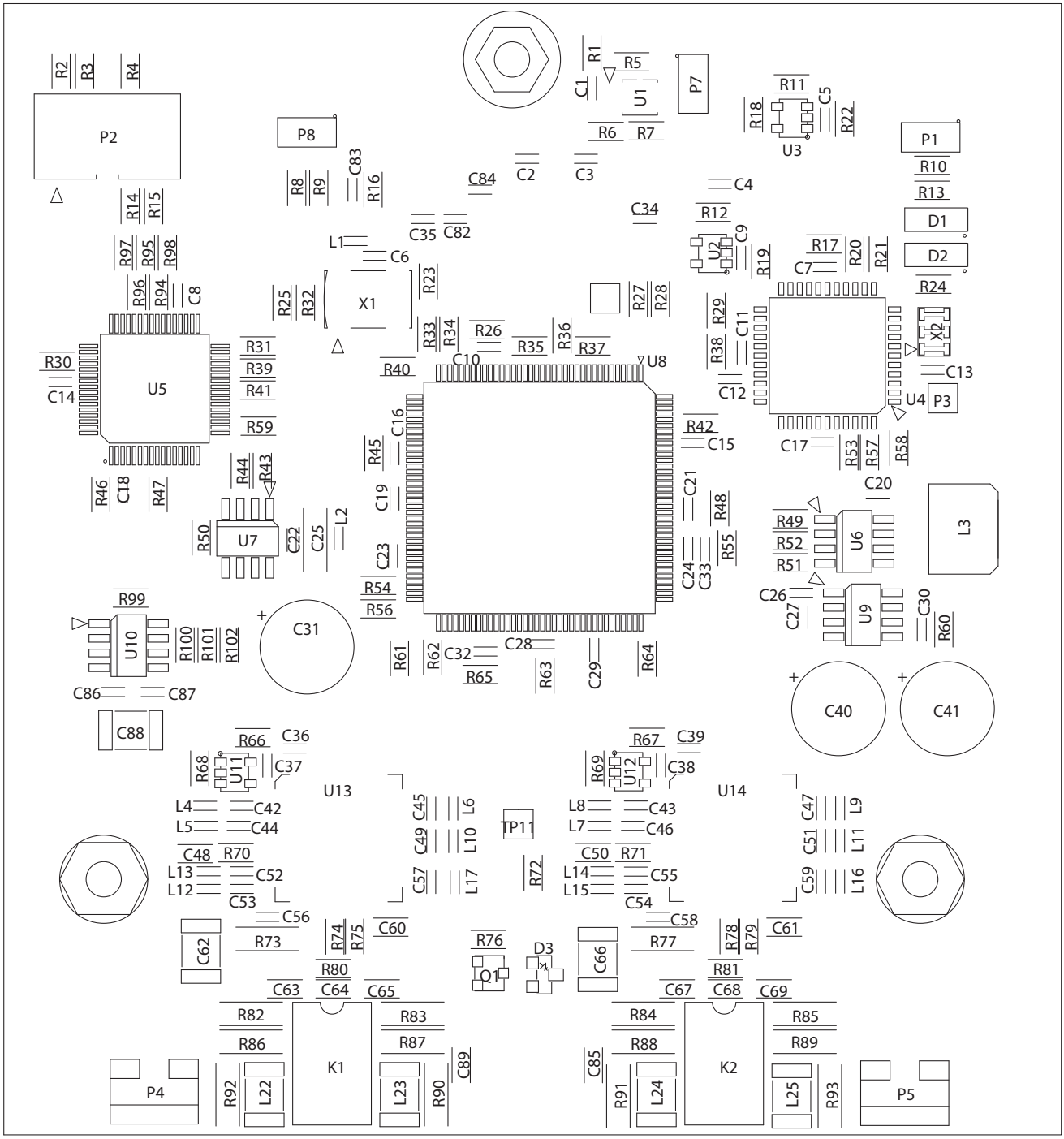

Figure 7-115 BROT BW52 Ultra-high Bandwidth Option Module (top) Rev 2

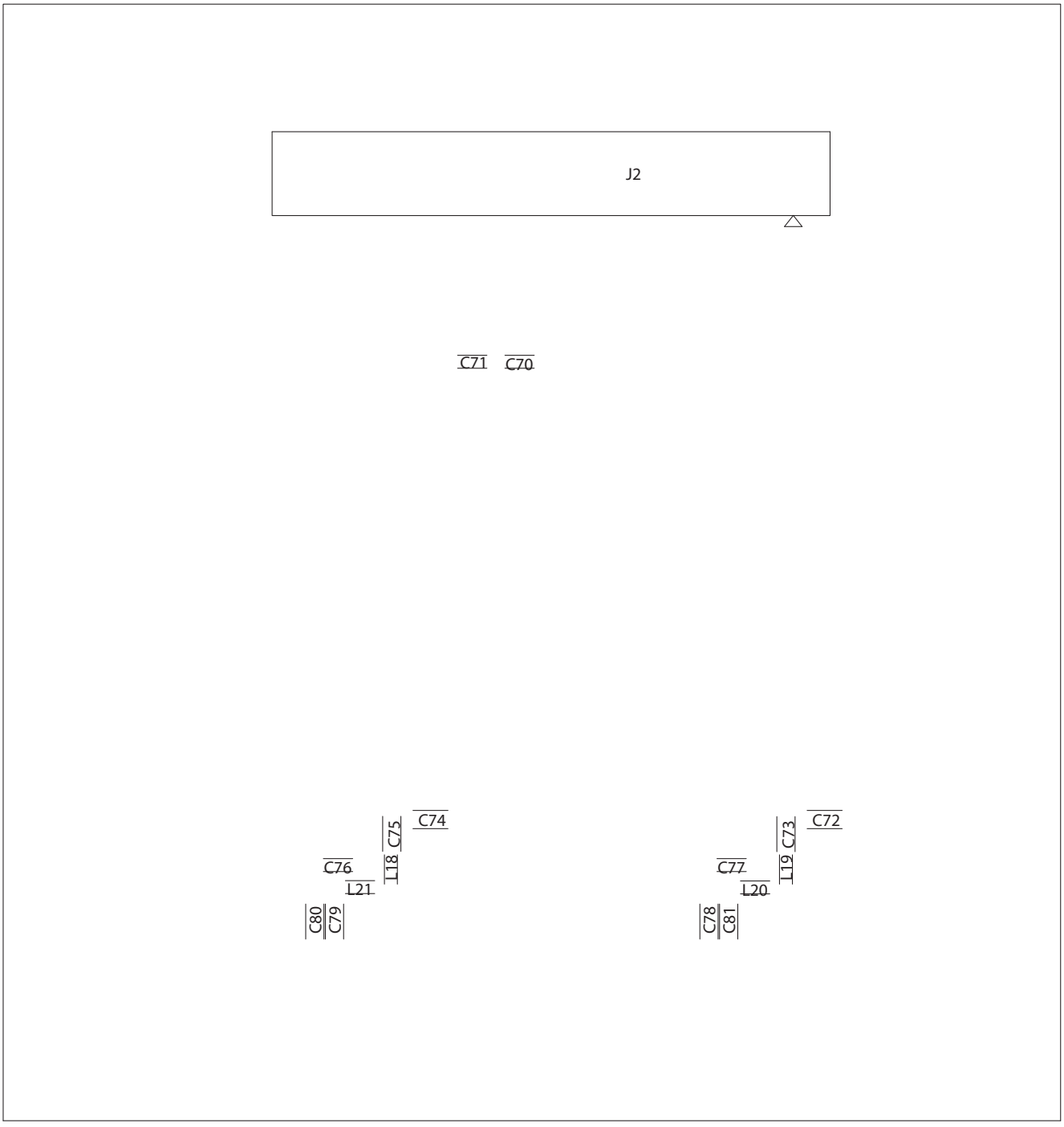

Figure 7-116 BROT BW52 Ultra-high Bandwidth Option Module (bottom) Rev 2

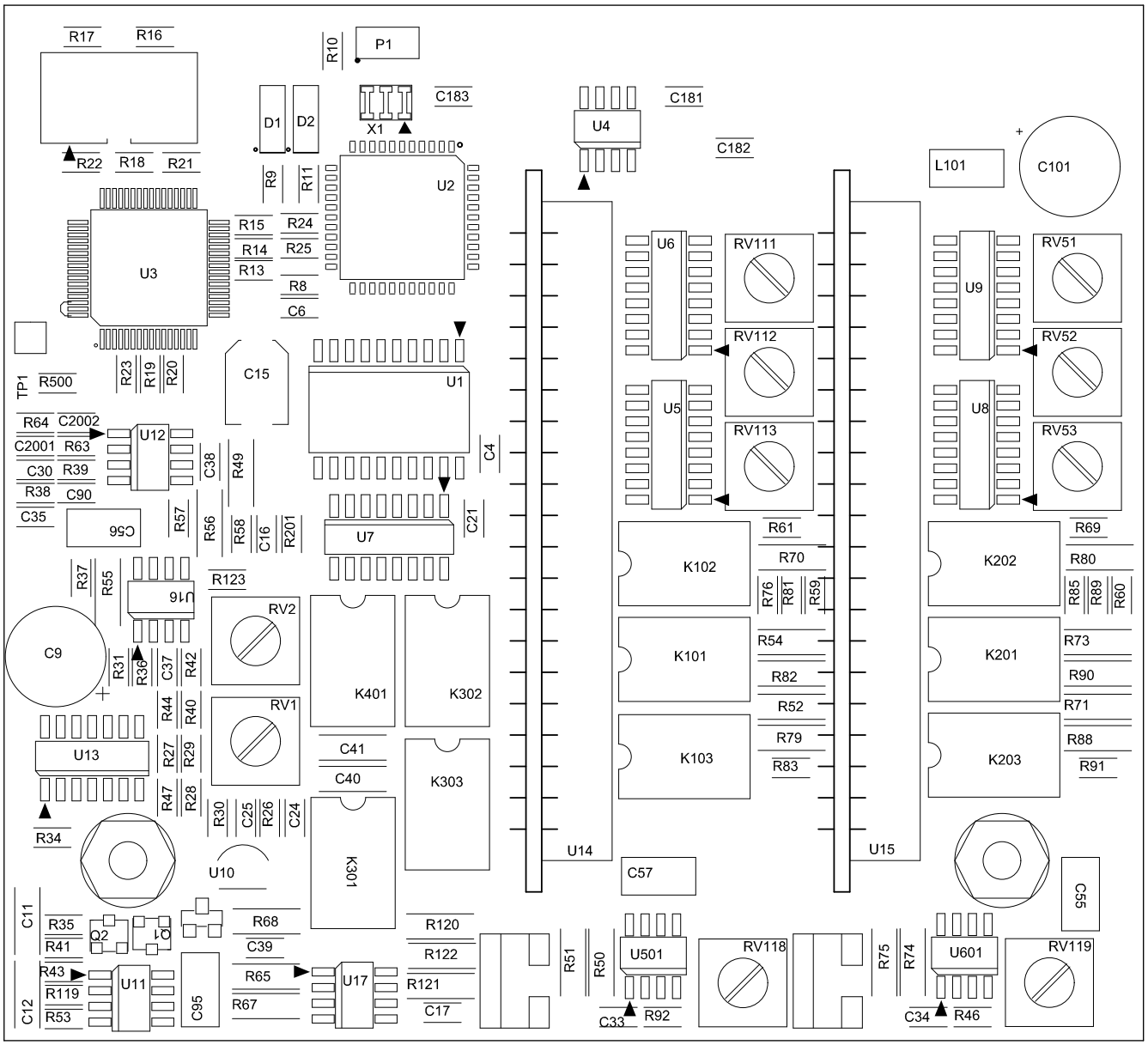

Figure 7-117 BSAT AG52 Analog Generator Option Module (top) Rev 0

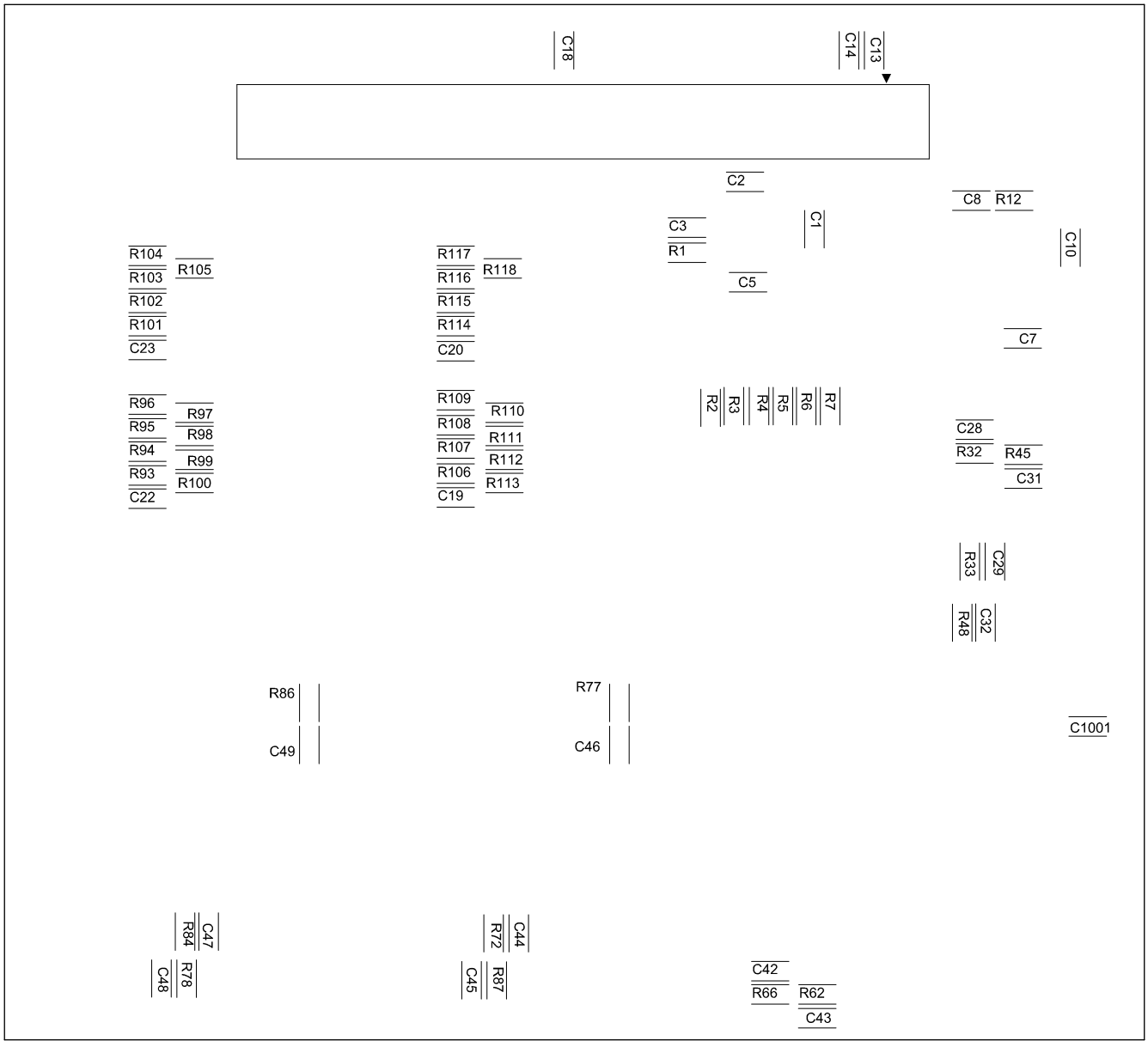

Figure 7-118 BSAT AG52 Analog Generator Option Module (bottom) Rev 0

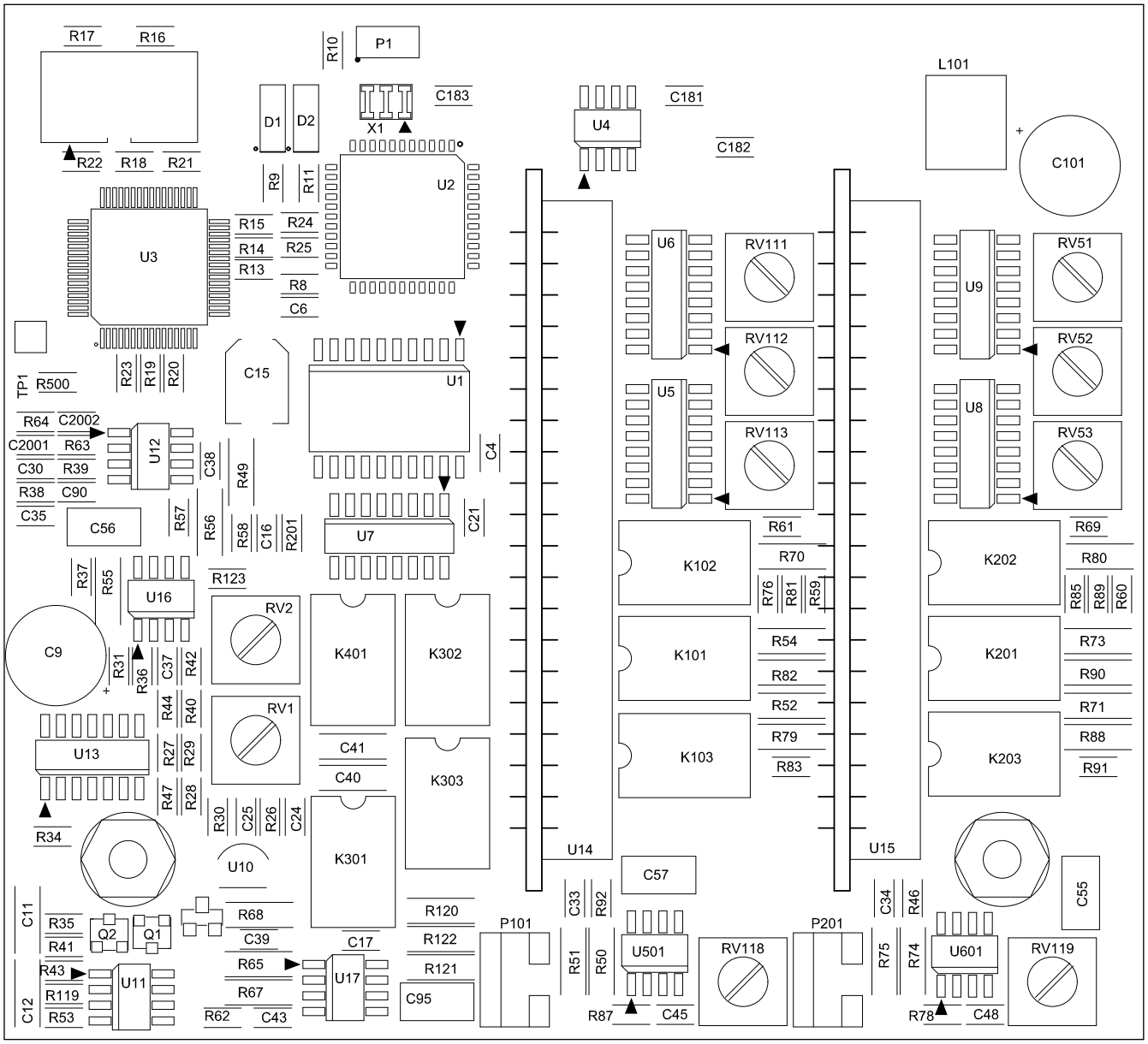

Figure 7-119 BSAT AG52 Analog Generator Option Module (top) Rev 1

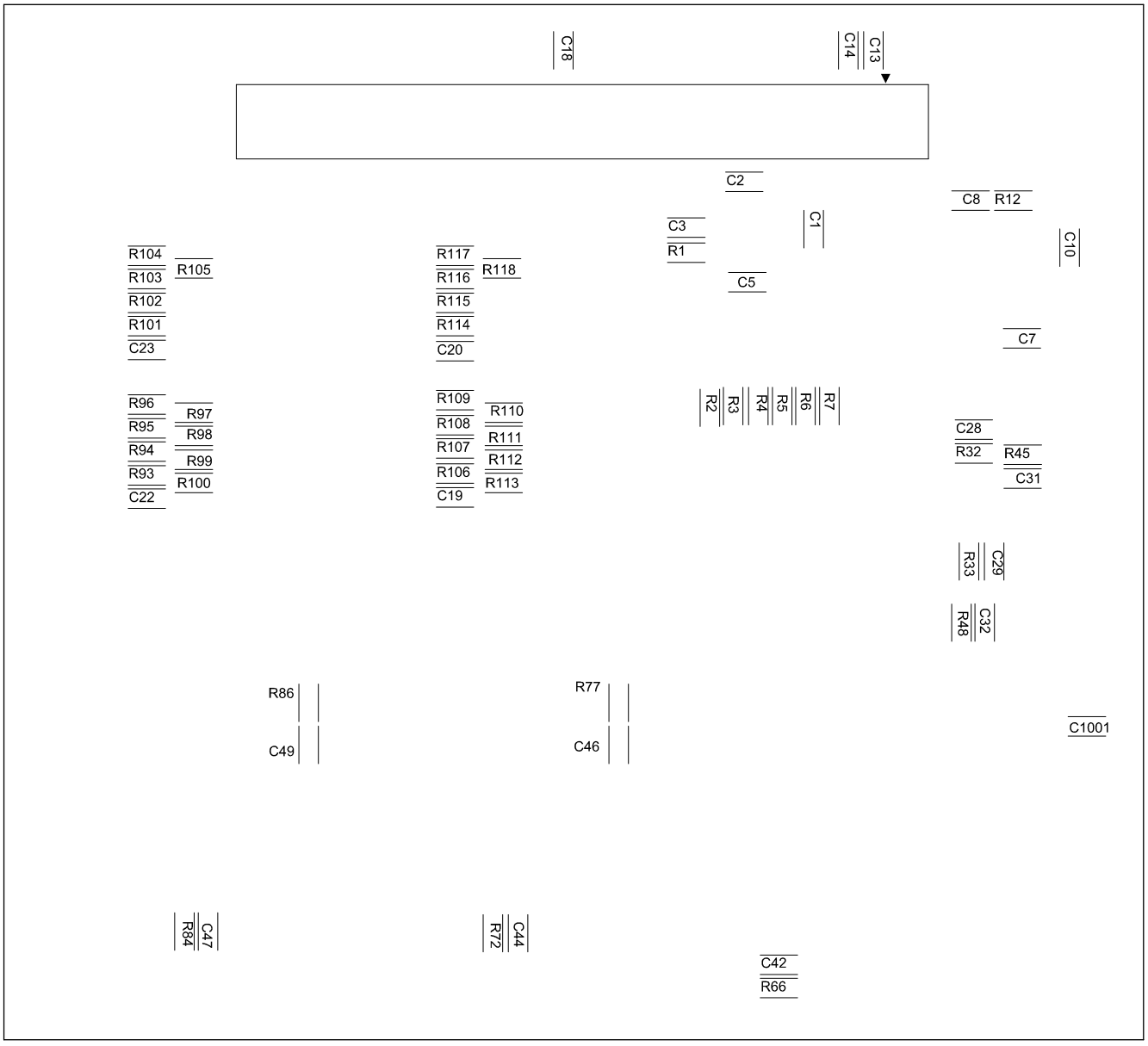

Figure 7-120 BSAT AG52 Analog Generator Option Module (bottom) Rev 1

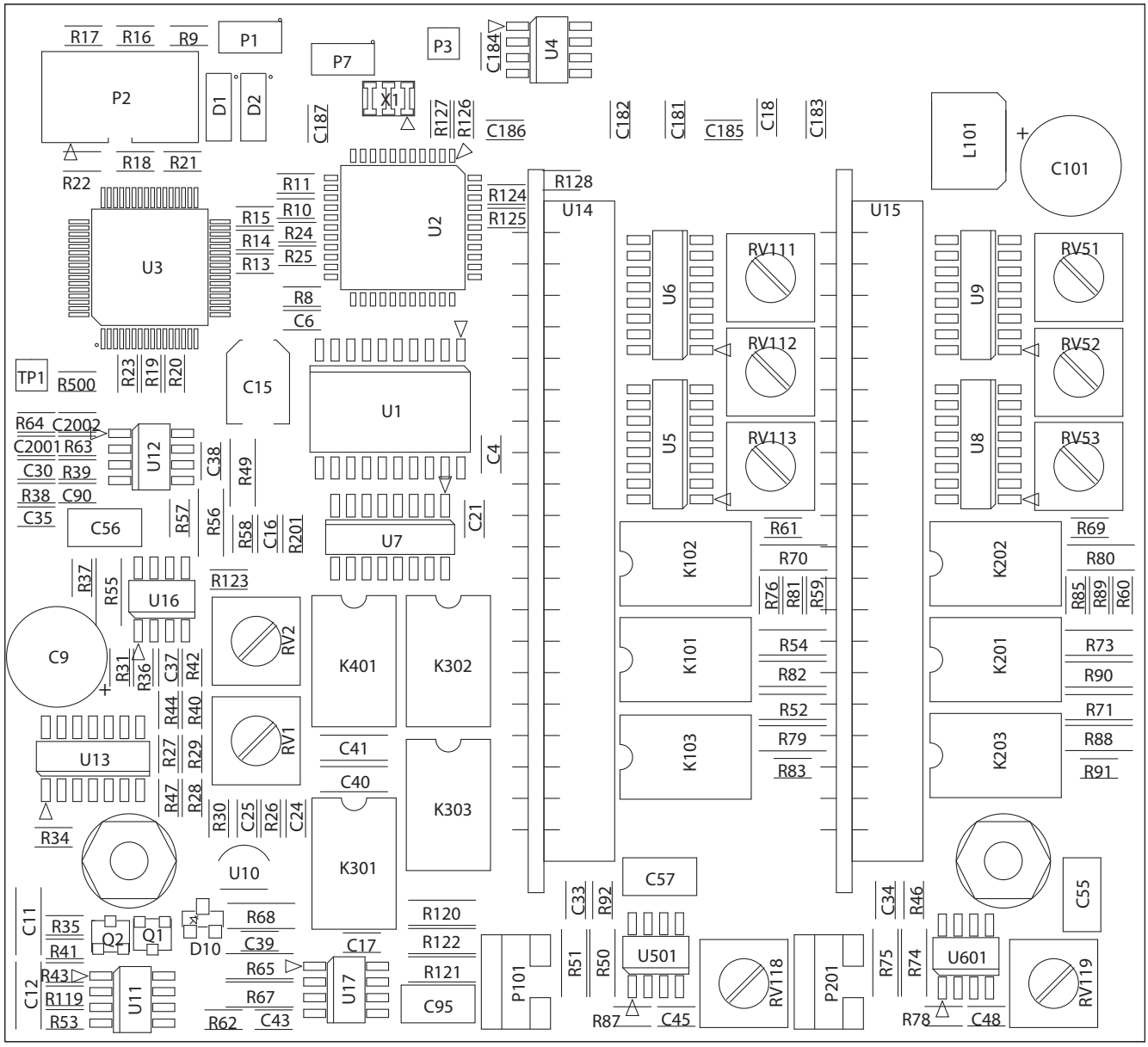

Figure 7-121 BSAT AG52 Analog Generator Option Module (top) Rev 2

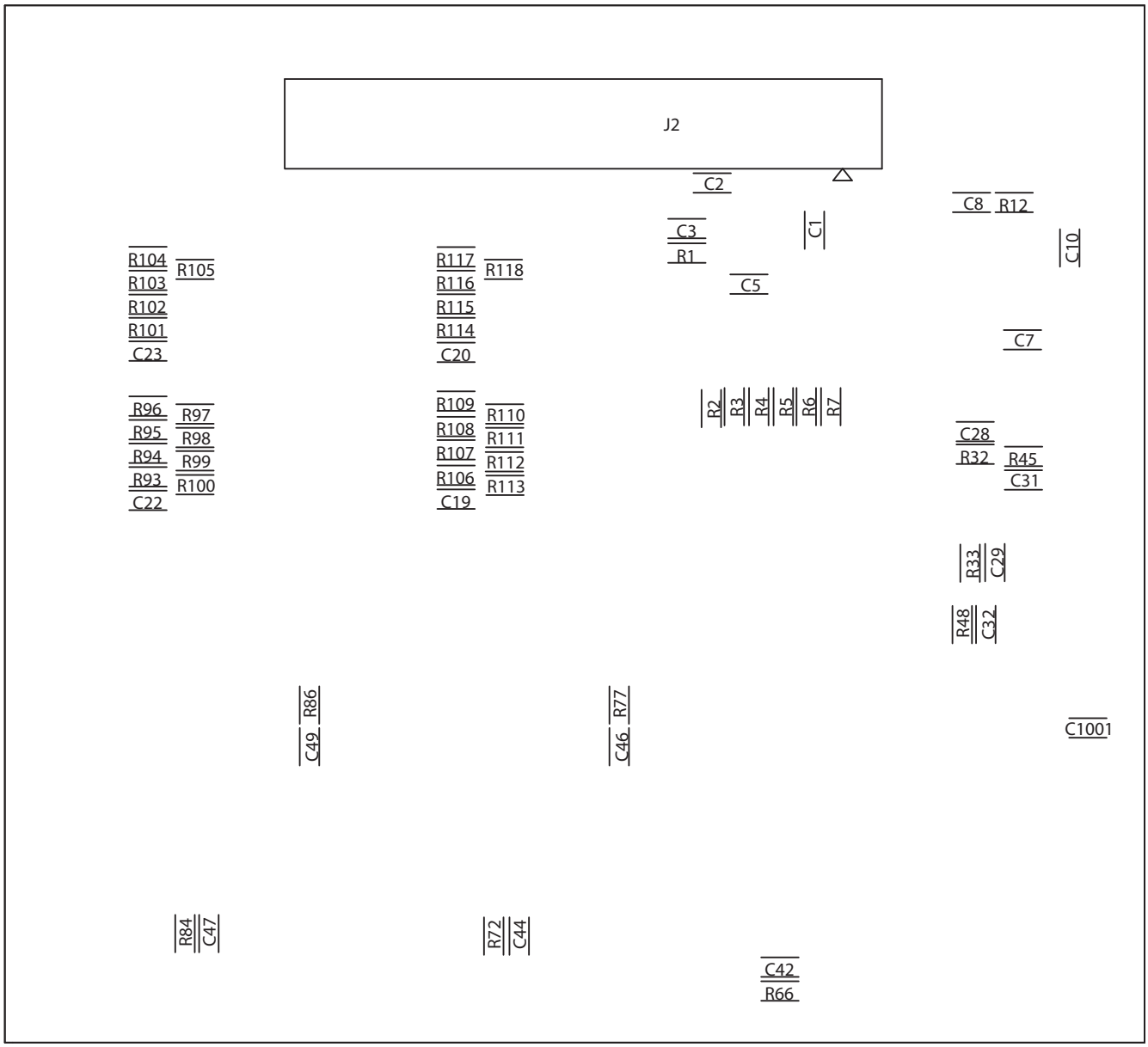

Figure 7-122 BSAT AG52 Analog Generator Option Module (bottom) Rev 2

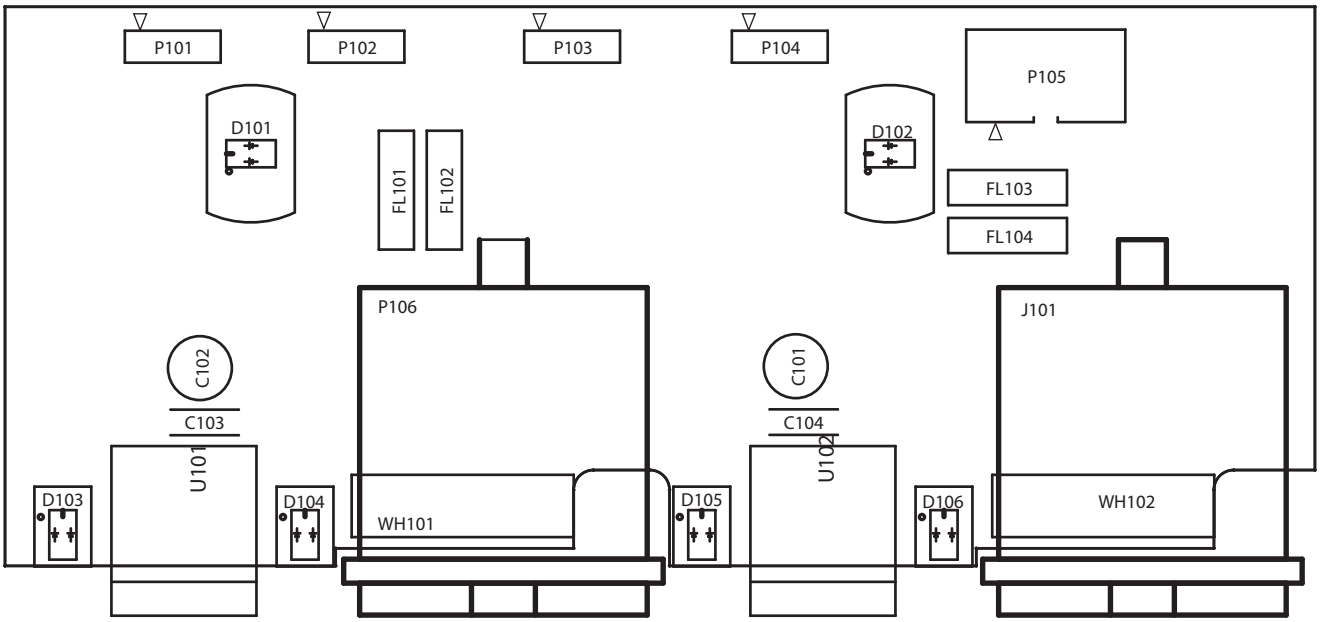

Figure 7-123 BSFP Advanced Digital IO Front Panel Rev 0

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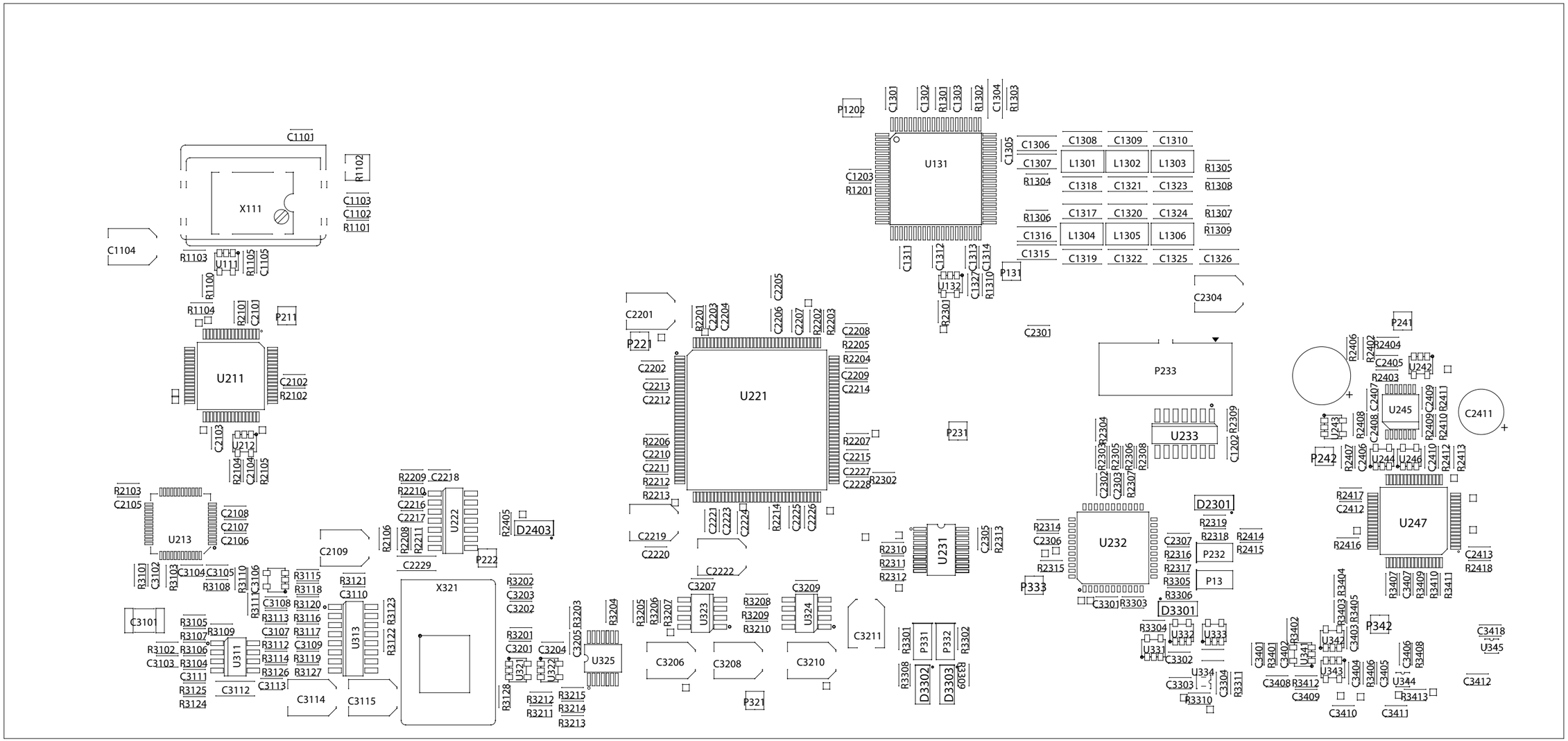

Figure 7-124 BSOL System Clock Module (top) Rev 0

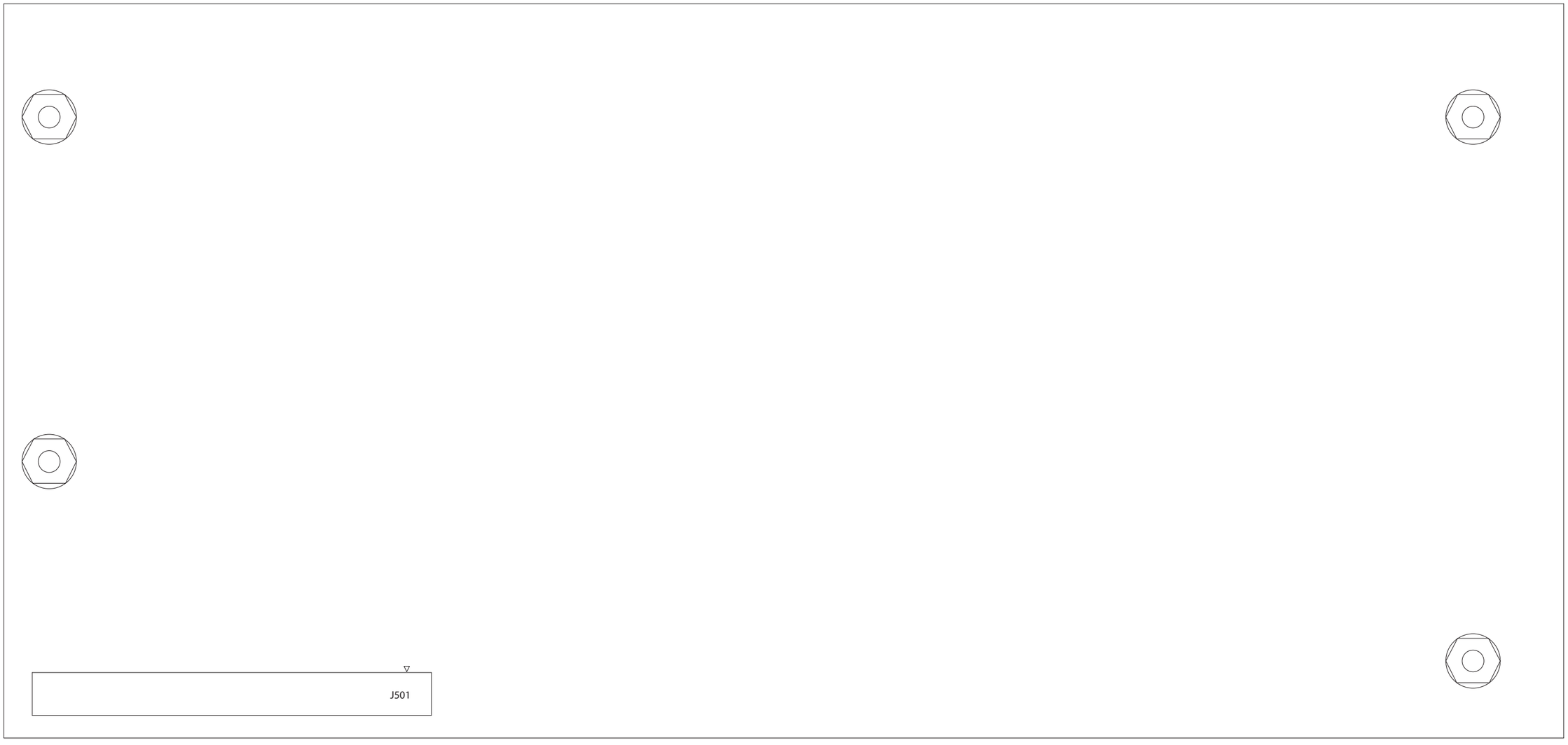

Figure 7-125 BSOL System Clock Module (bottom) Rev 0

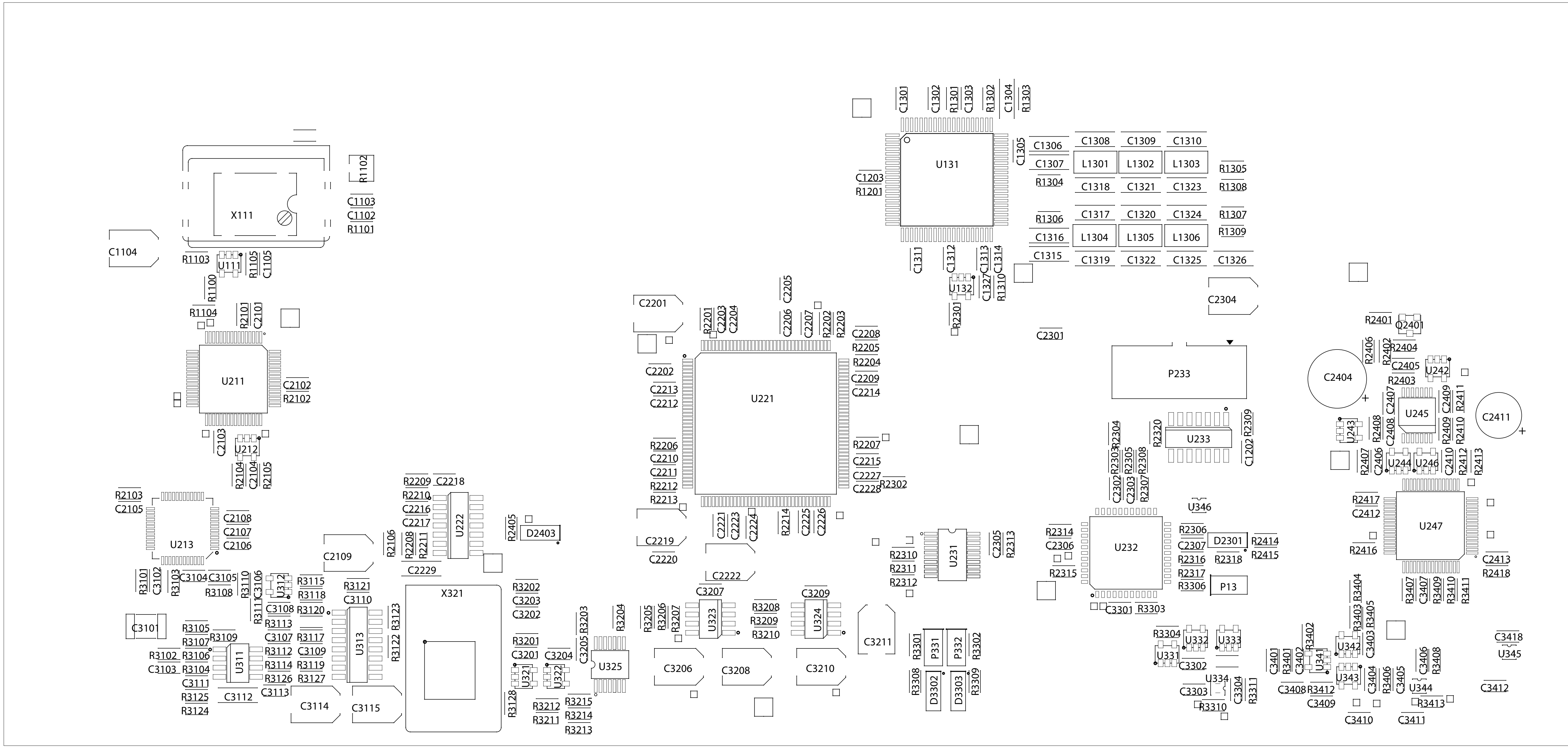

Figure 7-126 BSOL System Clock Module (top) Rev 1

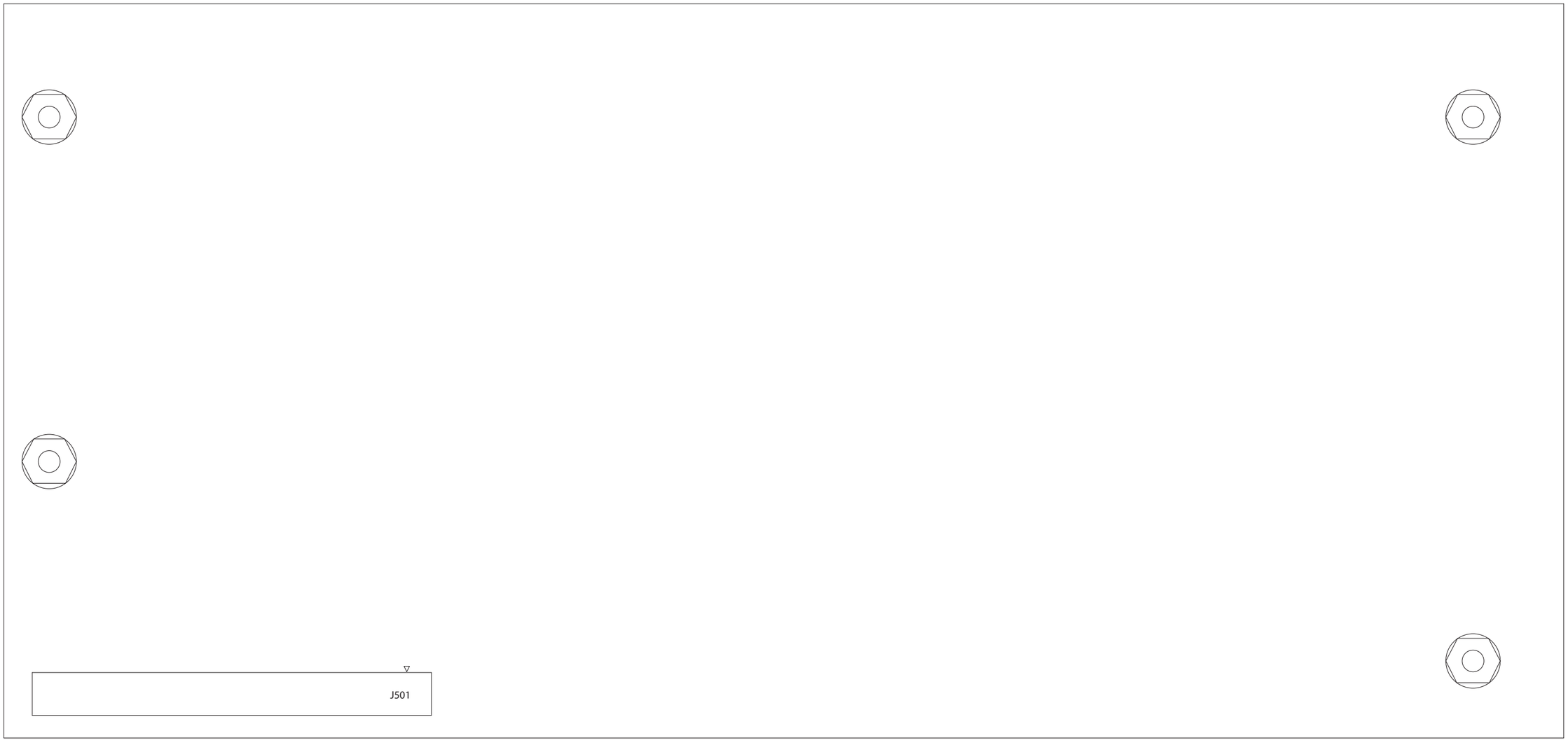

Figure 7-127 BSOL System Clock Module (bottom) Rev 1

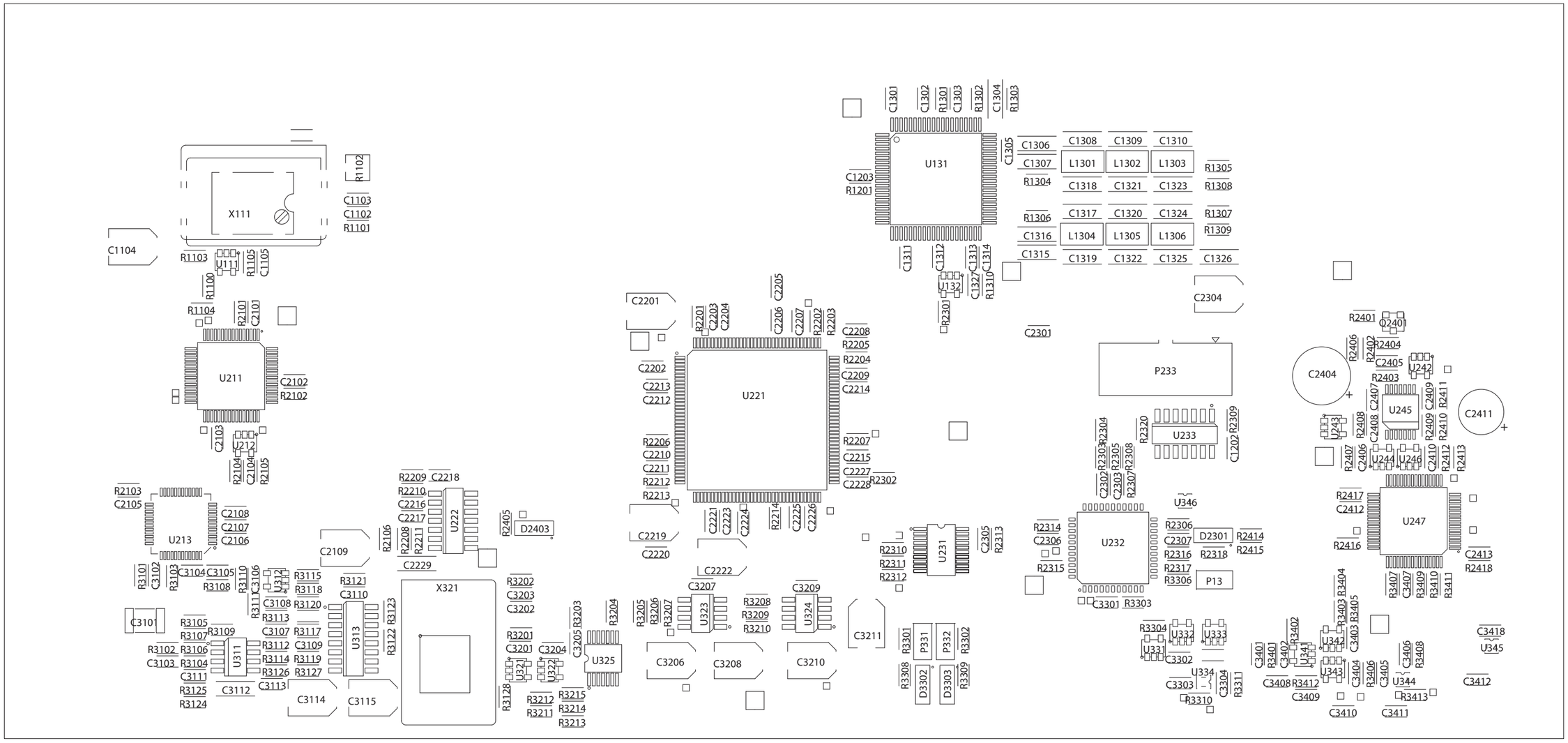

Figure 7-128 BSOL System Clock Module (top) Rev 2

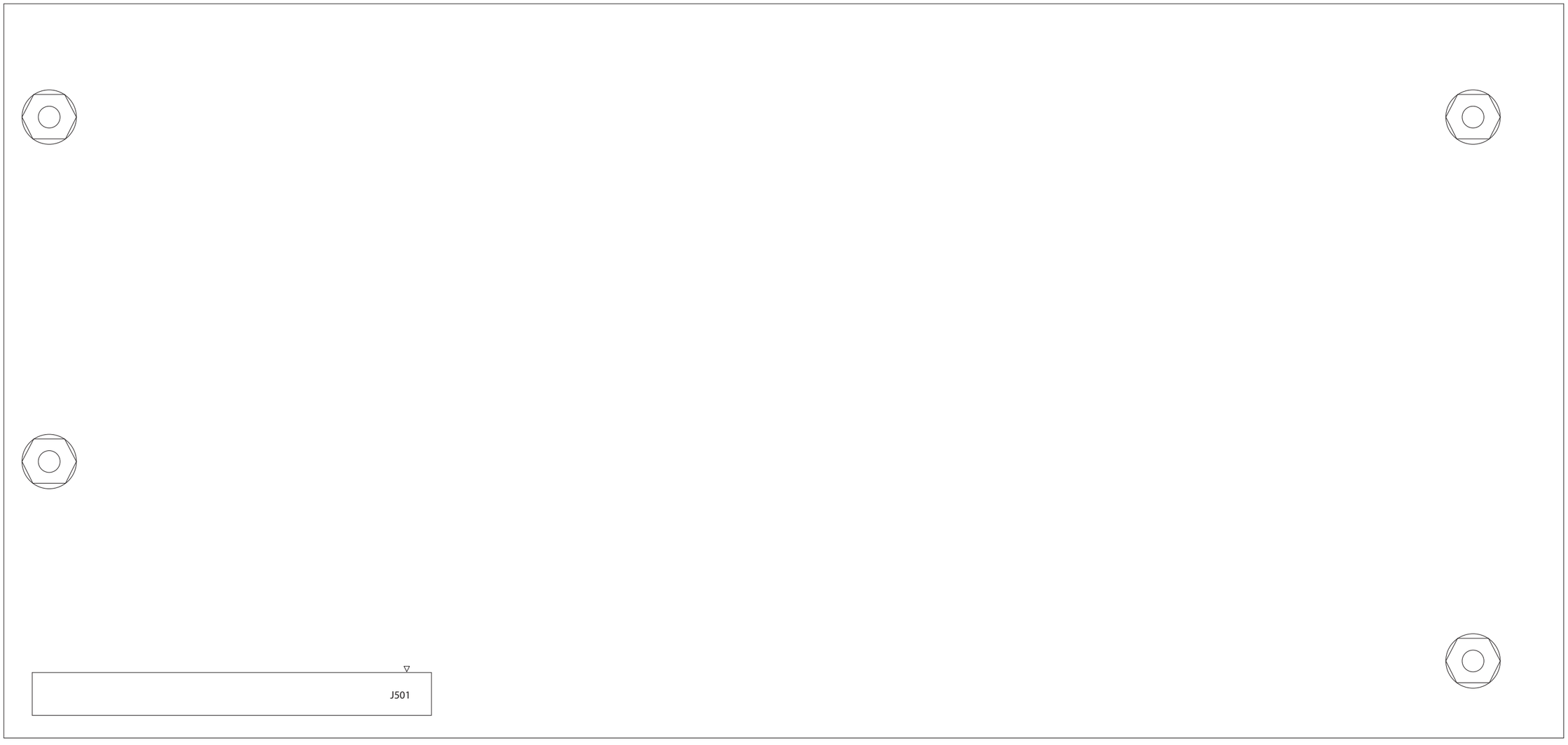

Figure 7-129 BSOL System Clock Module (bottom) Rev 2

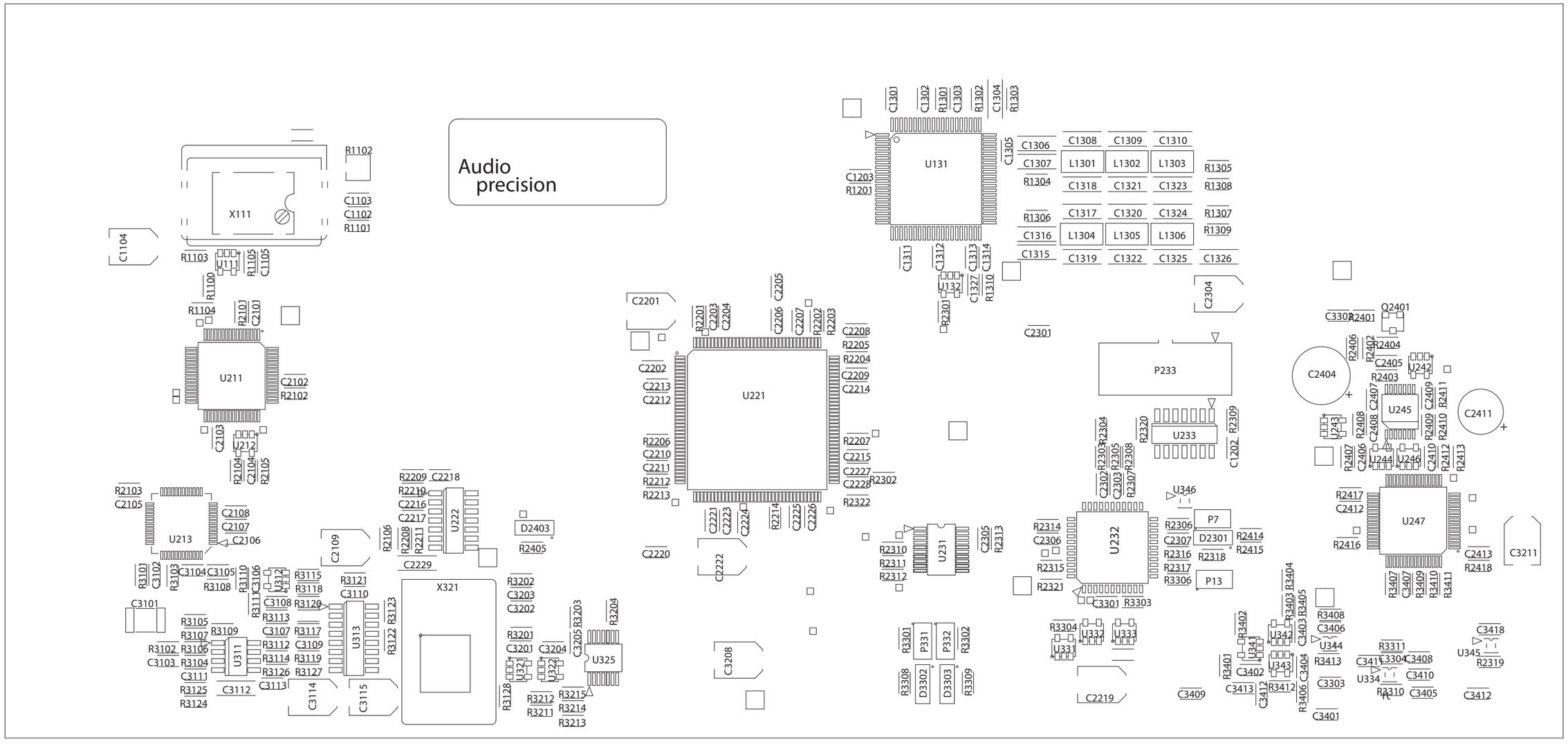

Figure 7-130 BSOL System Clock Module (top) Rev 3

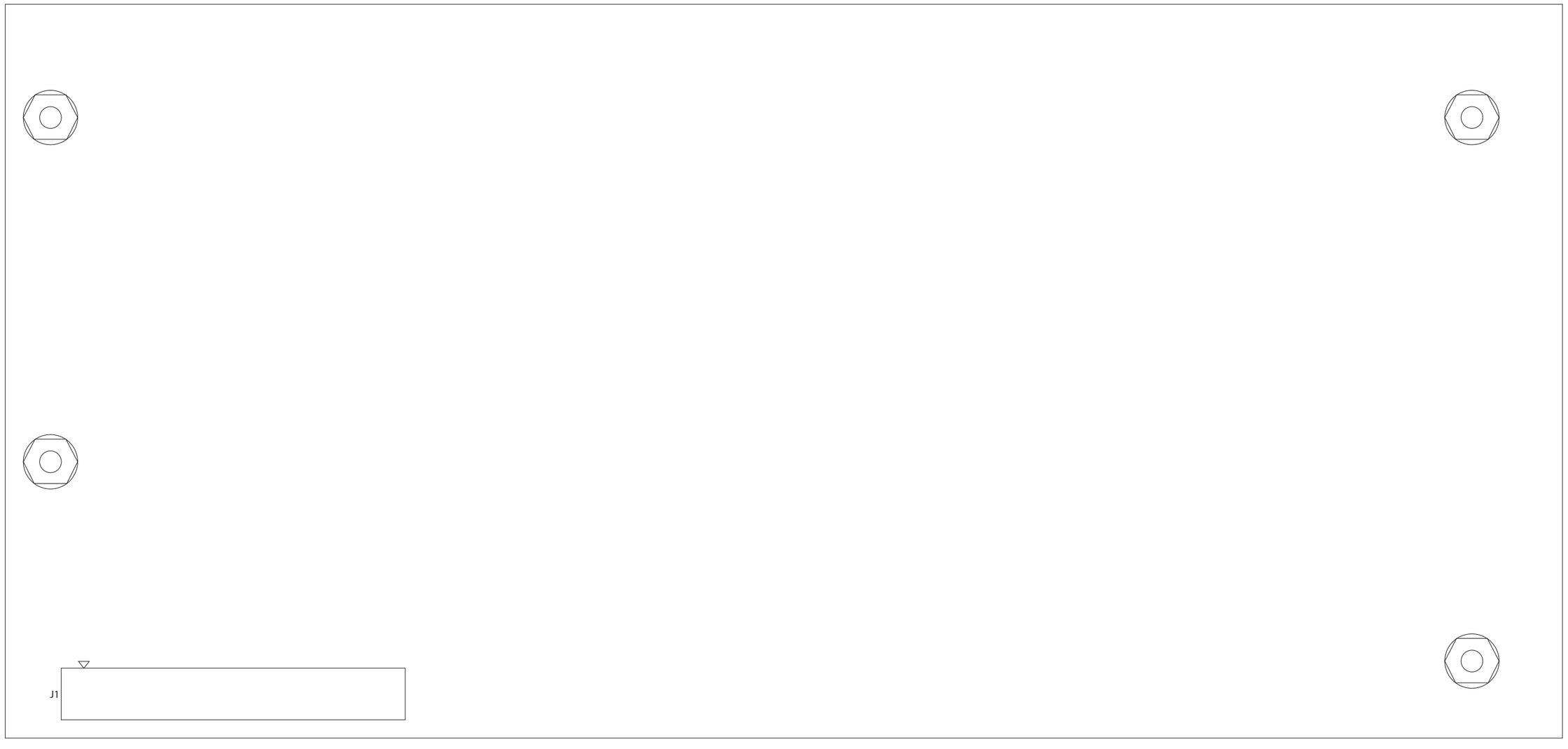

Figure 7-131 BSOL System Clock Module (bottom) Rev 3

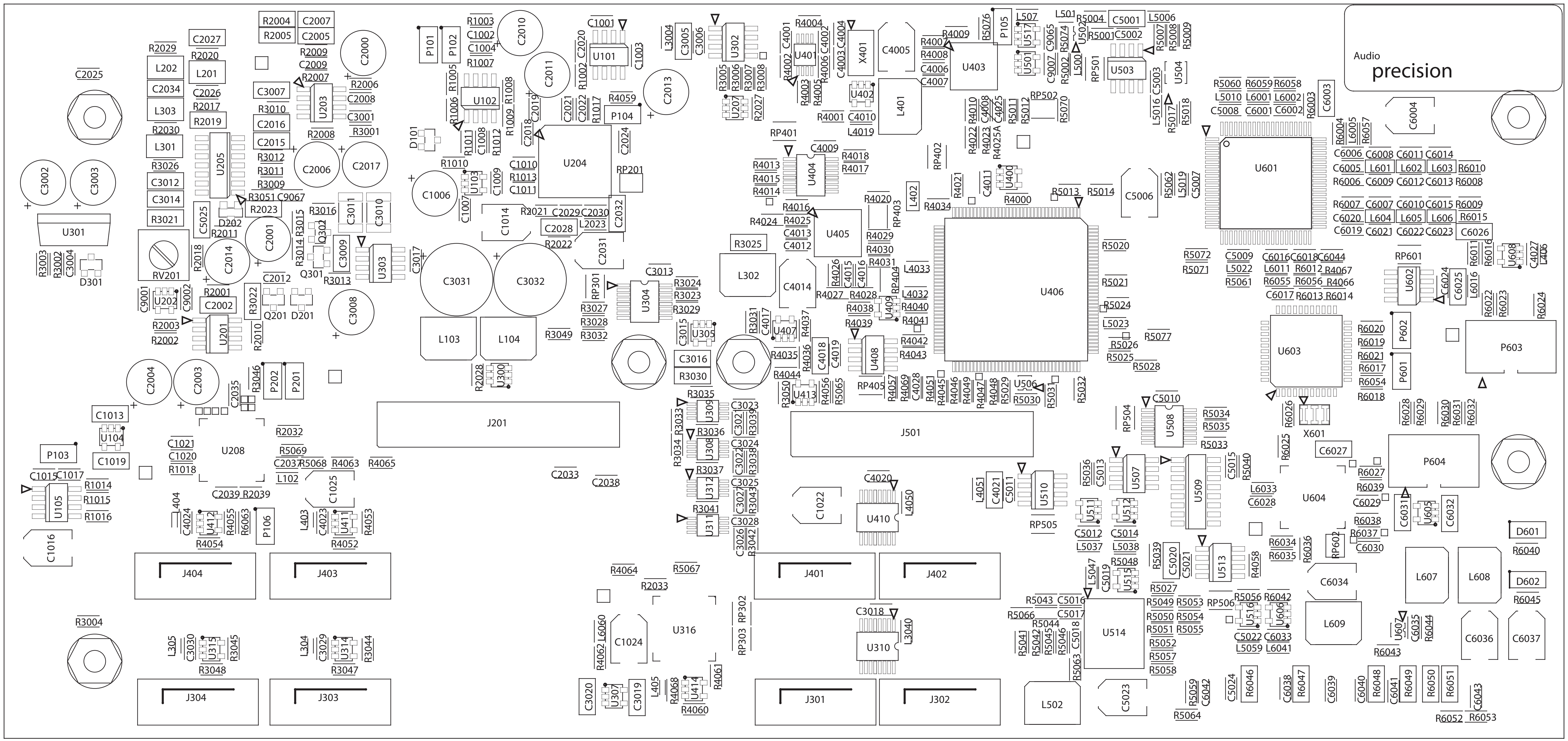

Figure 7-132 BSL2 Advanced System Clock Module (top) Rev 0

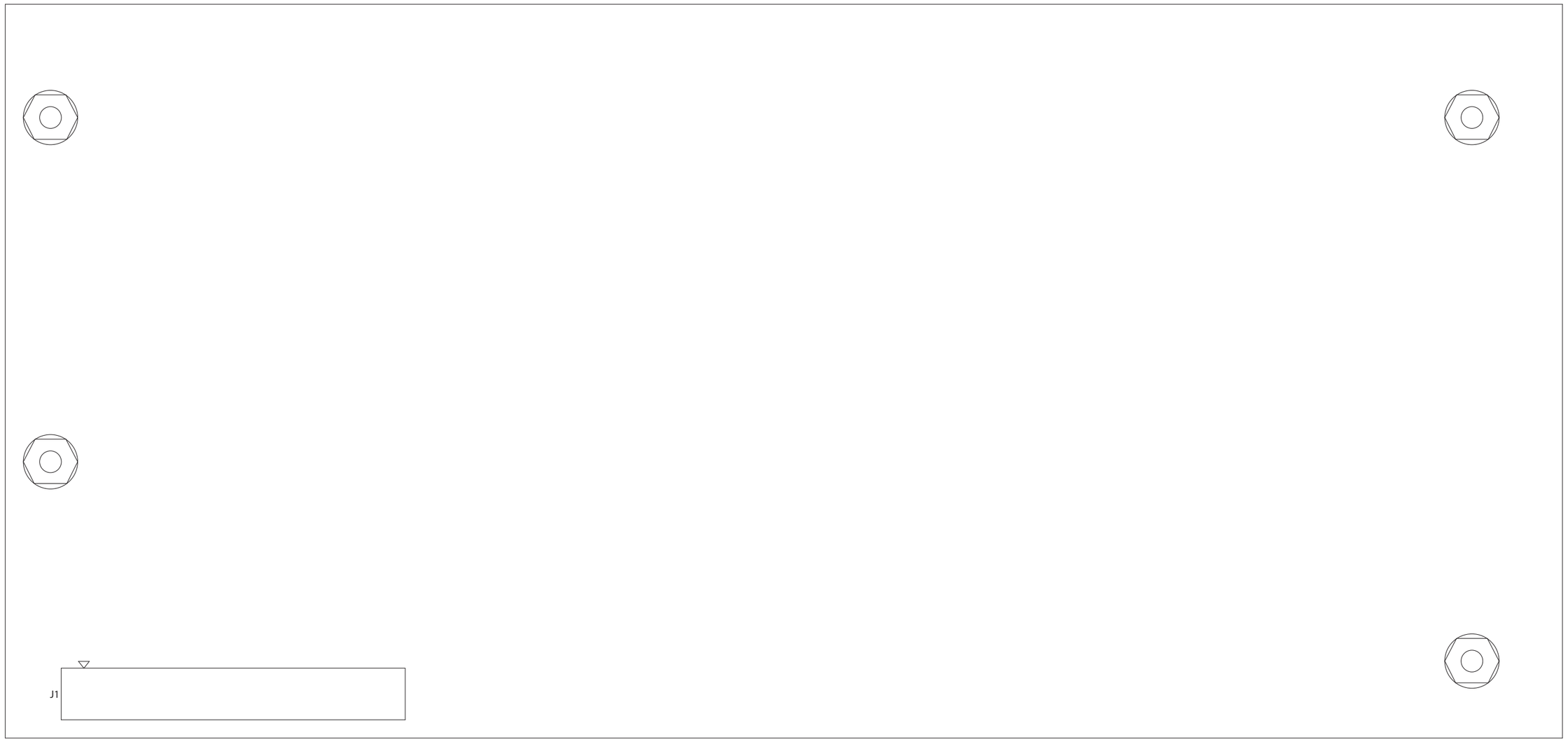

Figure 7-133 BSL2 Advanced System Clock Module (bottom) Rev 0

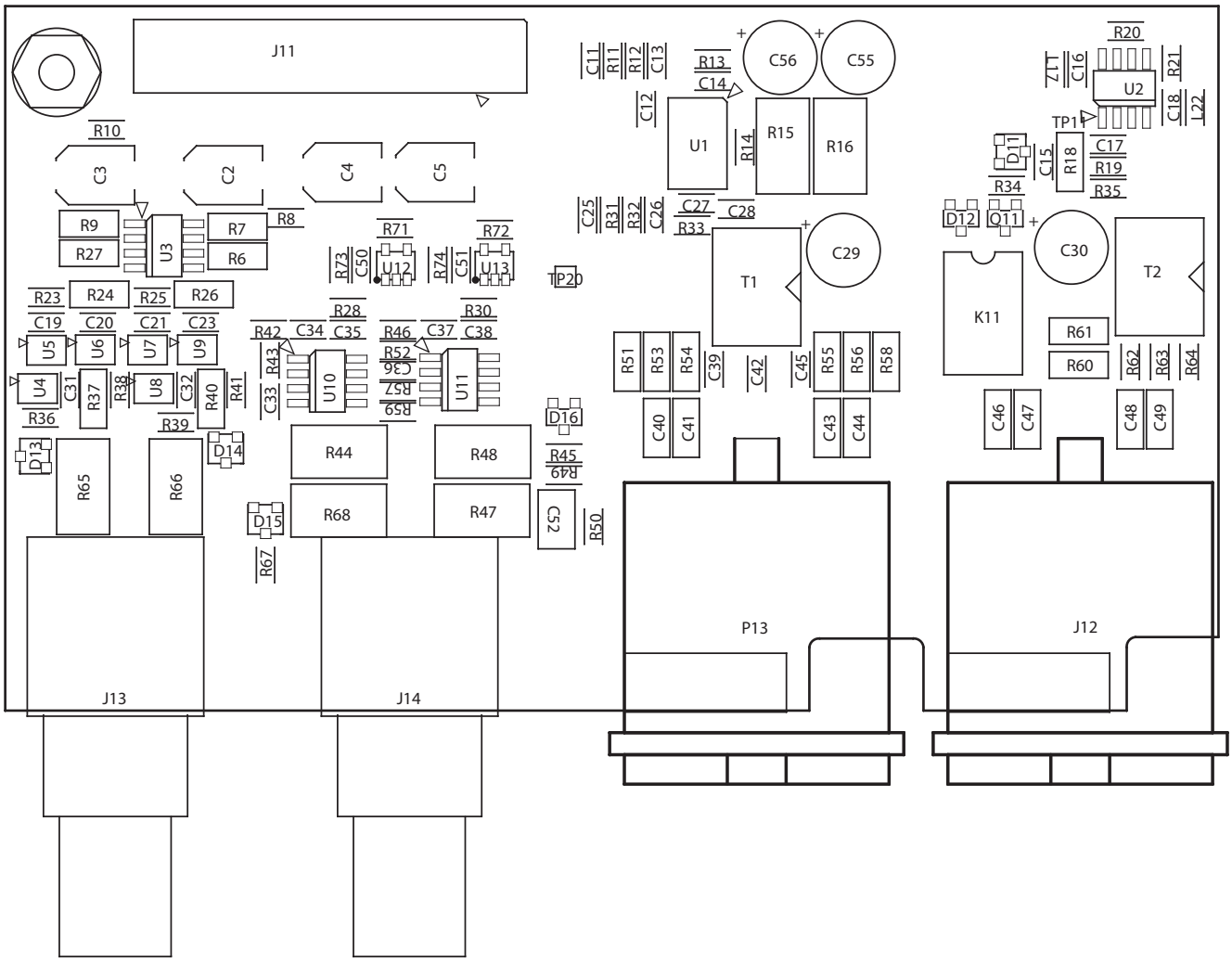

Figure 7-134 BSRP Advanced Master Clock Rear Panel Rev 0

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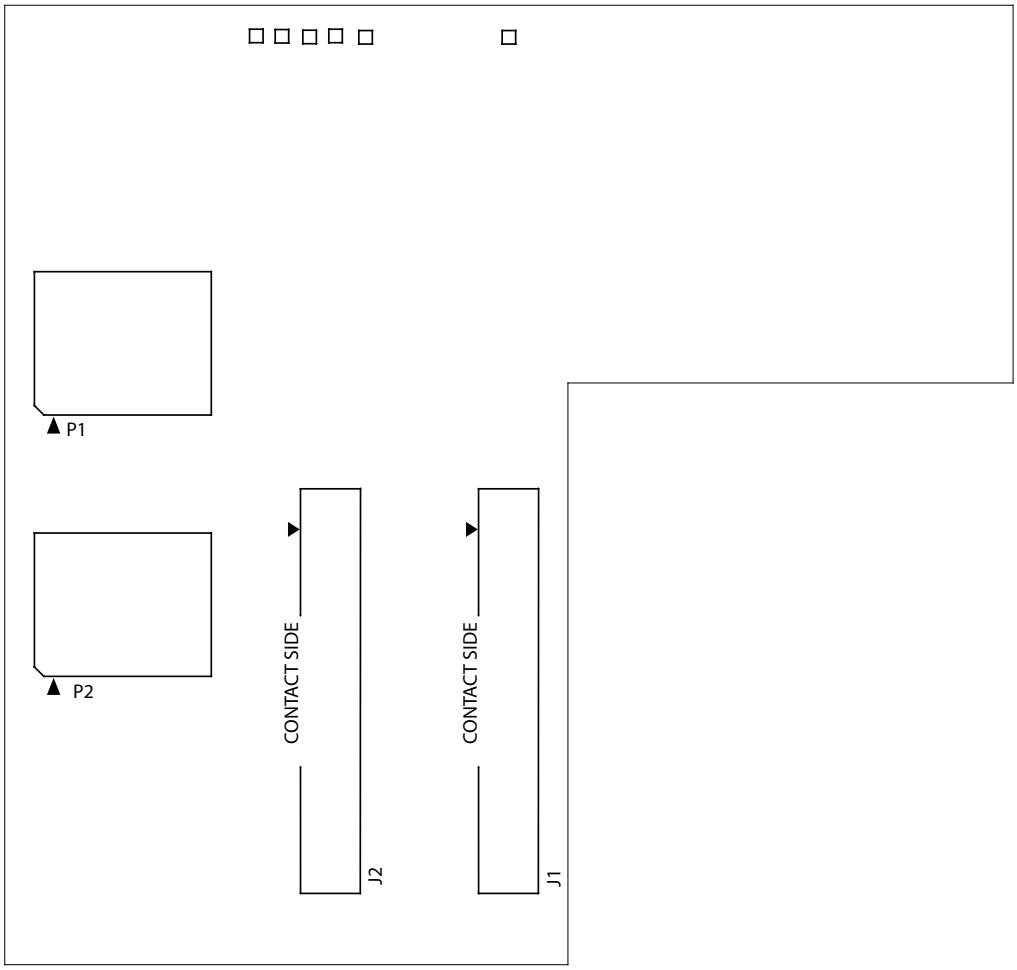


Figure 7-135 BSWZ Digital Serial I/O Connector Module (top) Rev 0

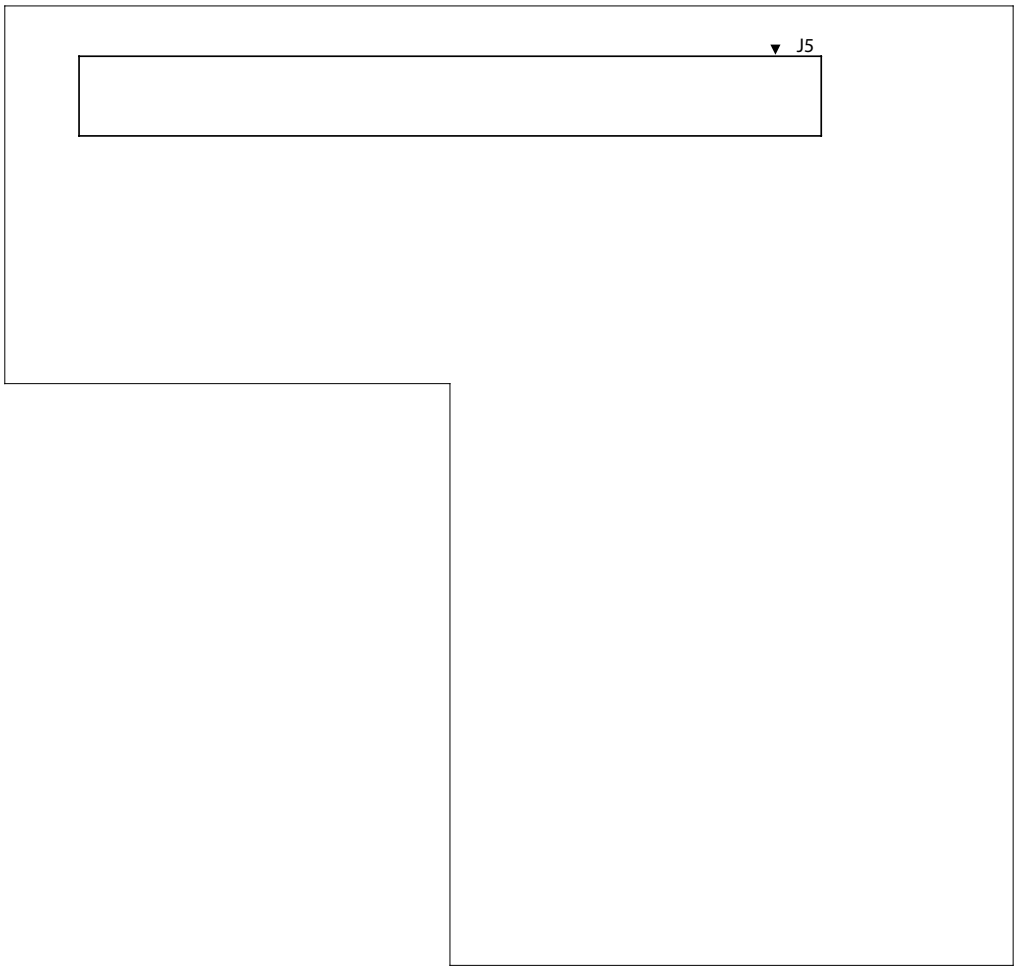


Figure 7-136 BSWZ Digital Serial I/O Connector Module (bottom) Rev 0

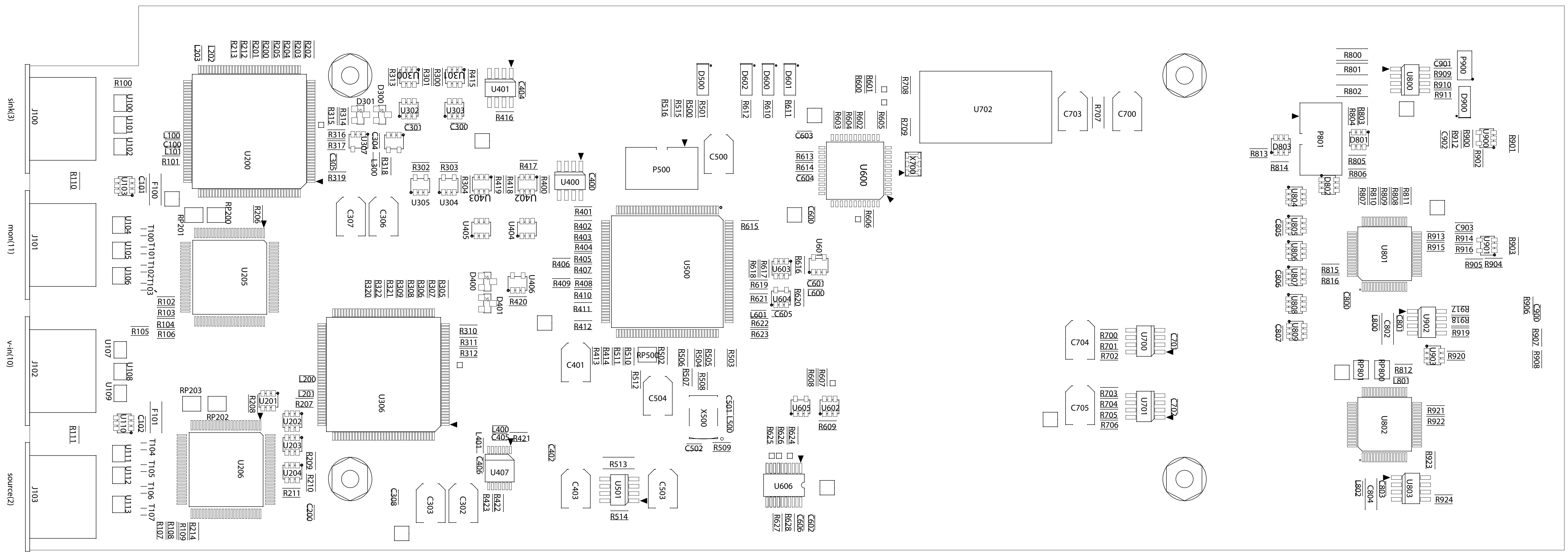


Figure 7-137 BVID HDMI Module (top) Rev 0

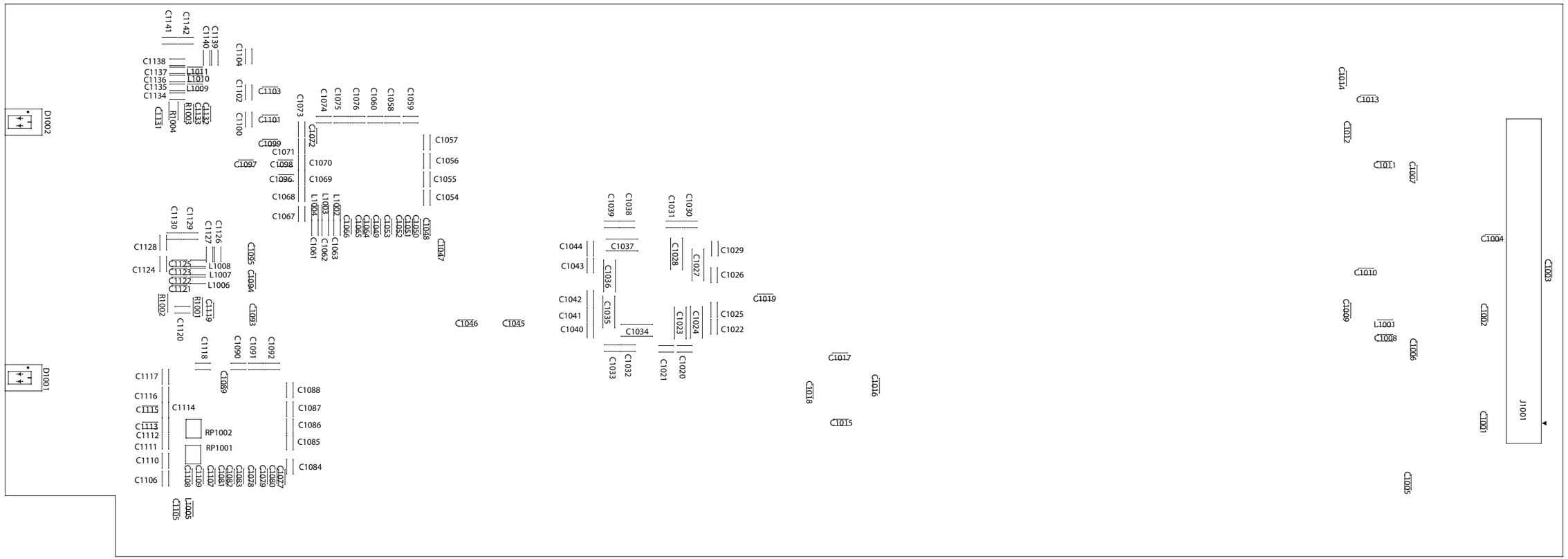


Figure 7-138 BVID HDMI Module (bottom) Rev 0

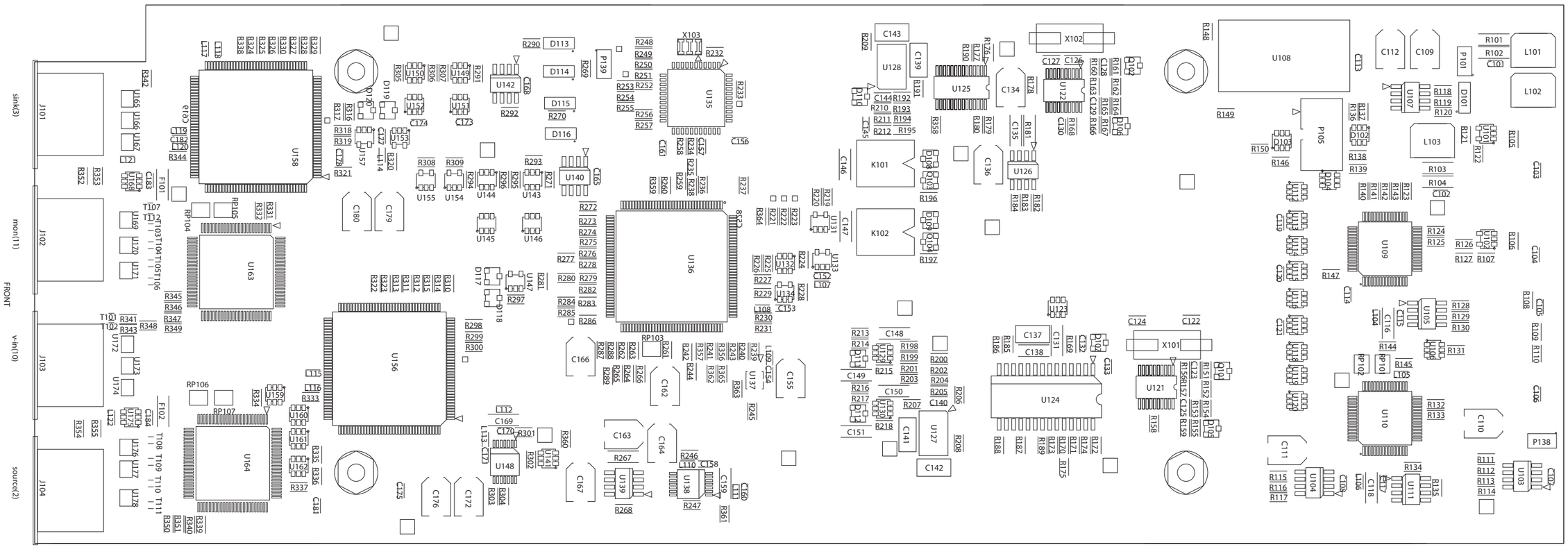


Figure 7-139 BVID HDMI Module (top) Rev 1

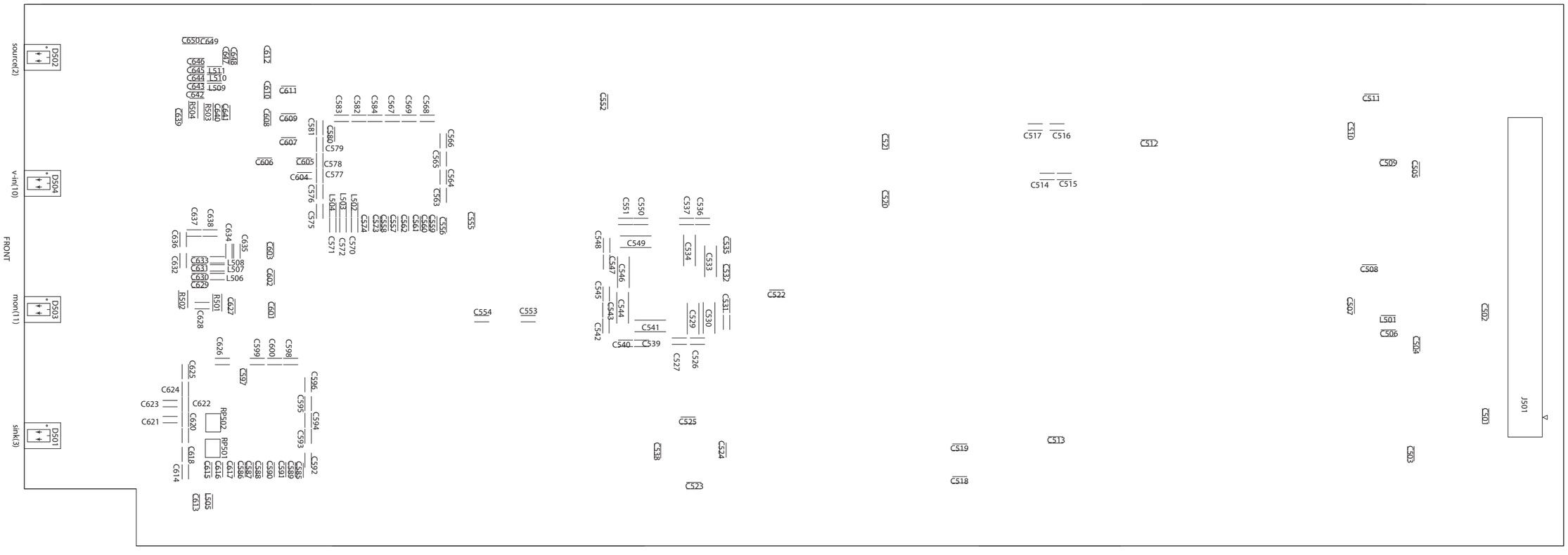


Figure 7-140 BVID HDMI Module (bottom) Rev 1

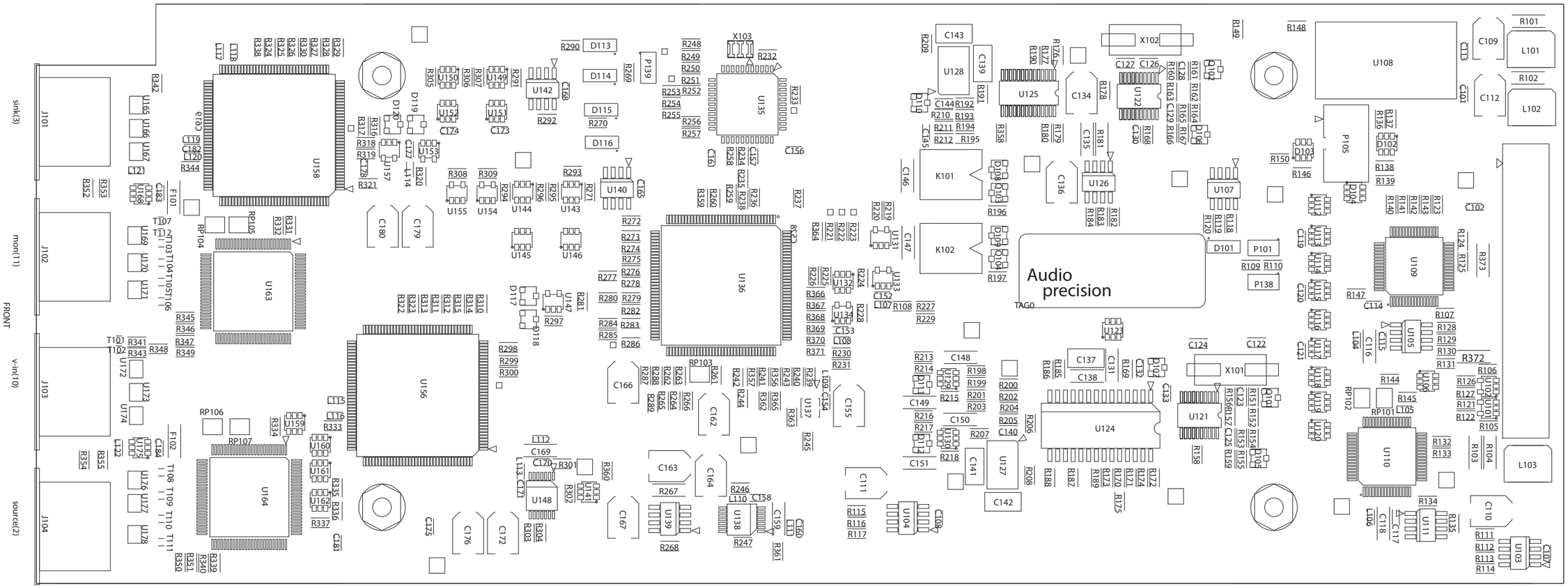


Figure 7-141 BVID HDMI Module (top) Rev 2

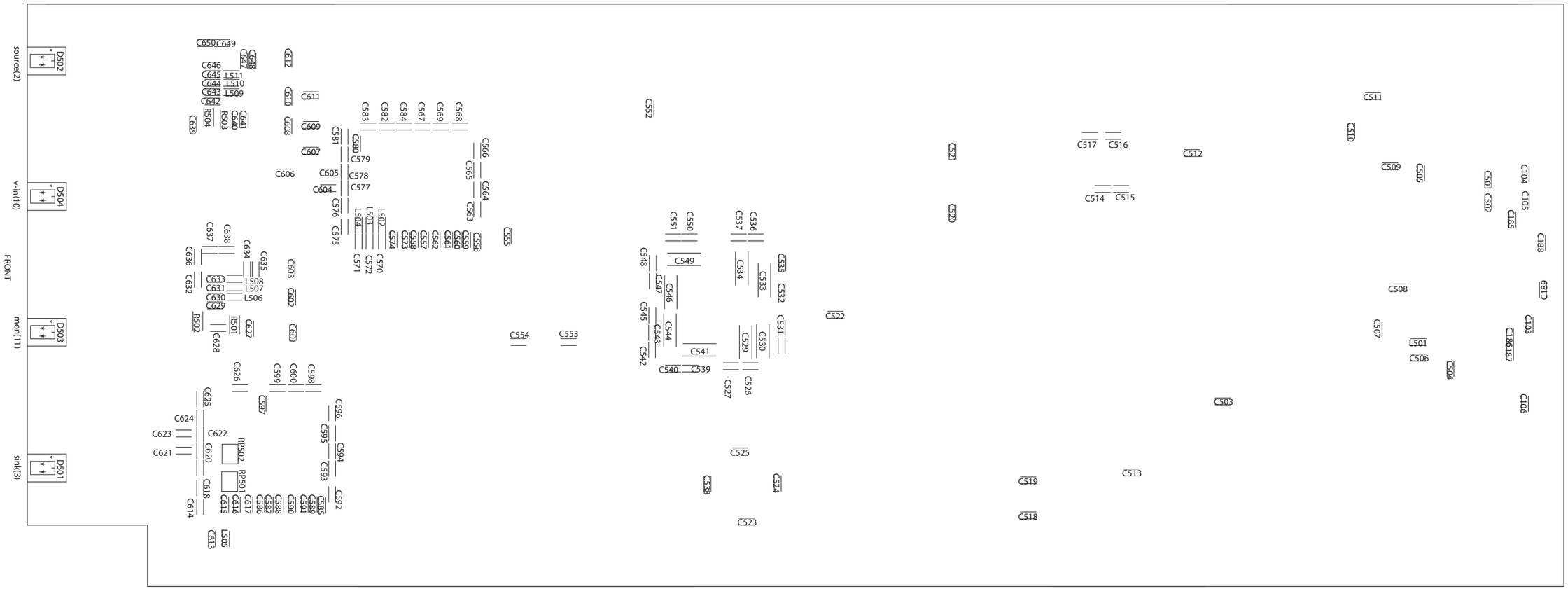


Figure 7-142 BVID HDMI Module (bottom) Rev 2

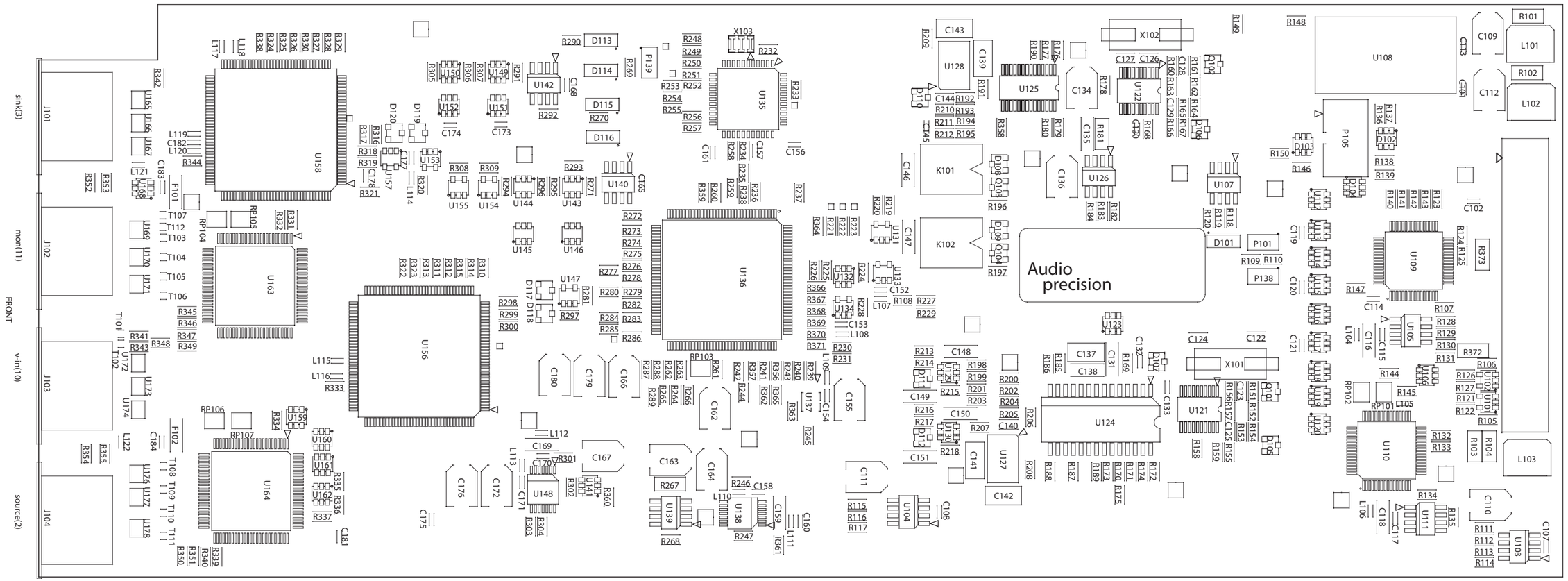


Figure 7-143 BVID HDMI Module (top) Rev 3

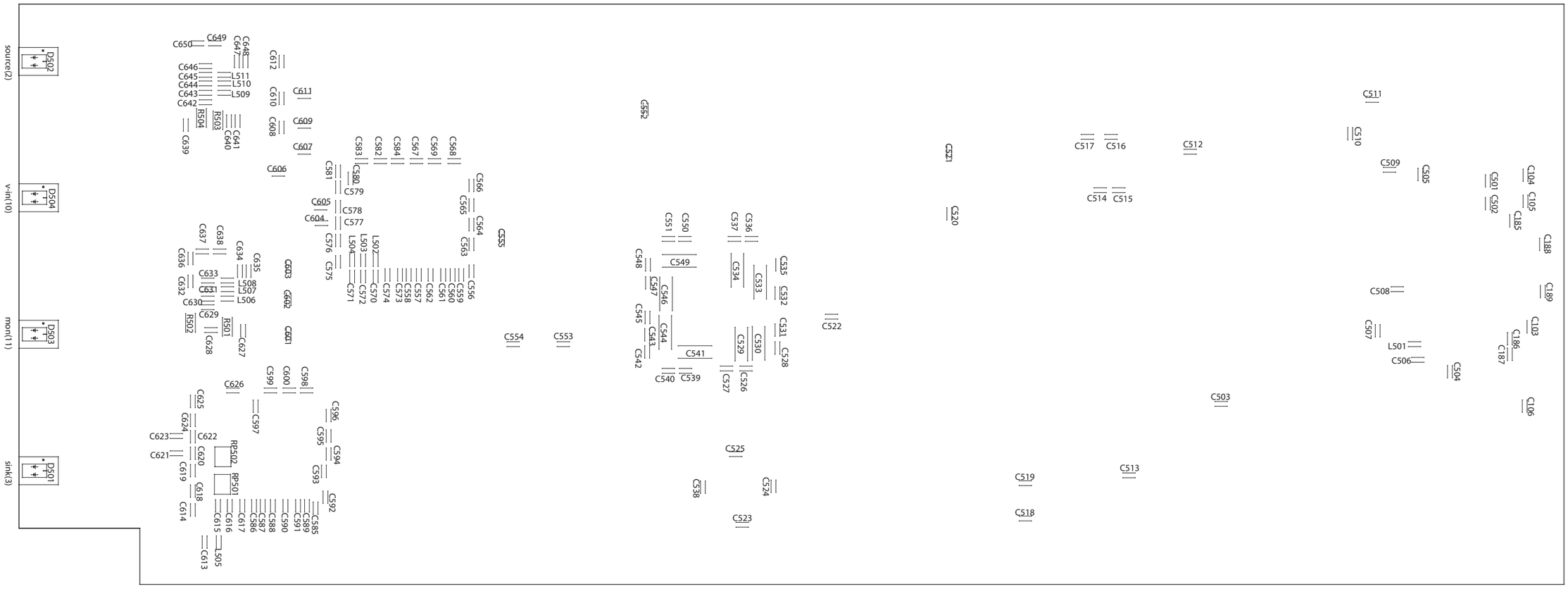


Figure 7-144 BVID HDMI Module (bottom) Rev 3

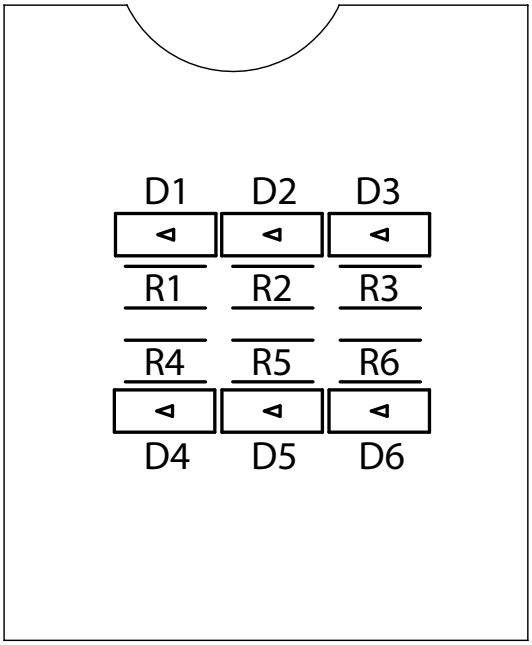


Figure 7-145 BVIV Power LED Front Panel Module (top) Rev 0

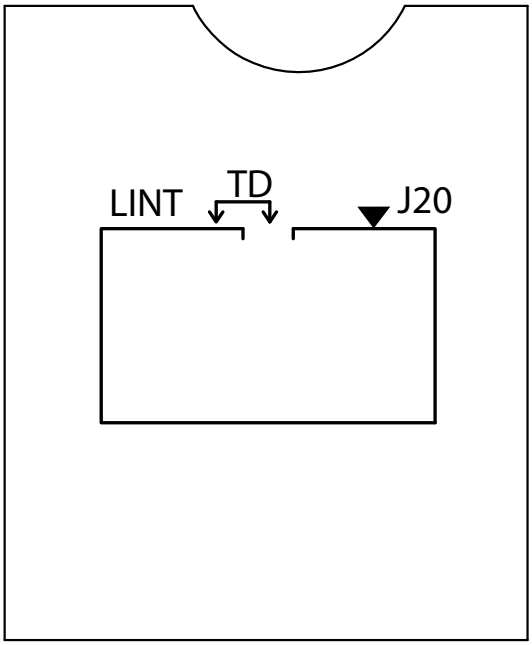


Figure 7-146 BVIV Power LED Front Panel Module (bottom) Rev 0

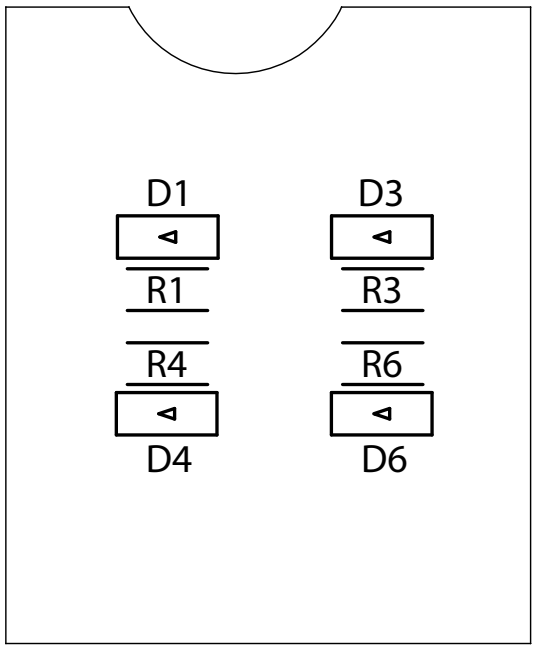


Figure 7-147 BVIV Power LED Front Panel Module (top) Rev 1

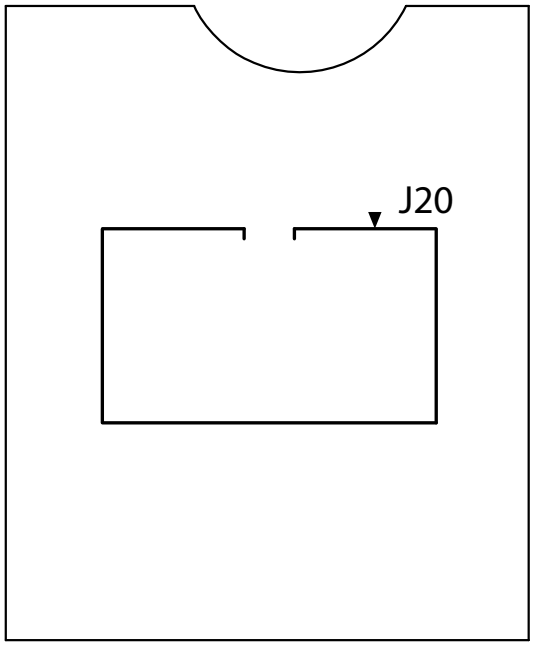


Figure 7-148 BVIV Power LED Front Panel Module (bottom) Rev 1

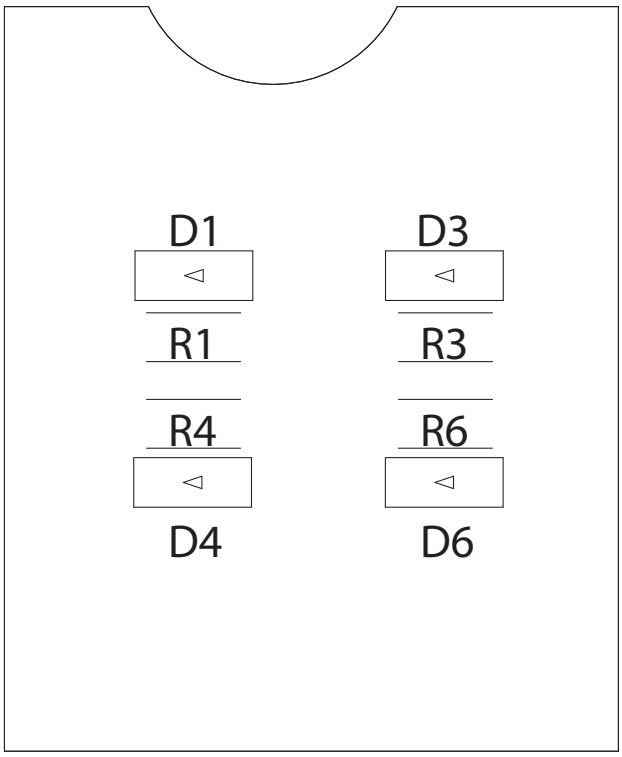


Figure 7-149 BVIV Power LED Front Panel Module (top) Rev 2

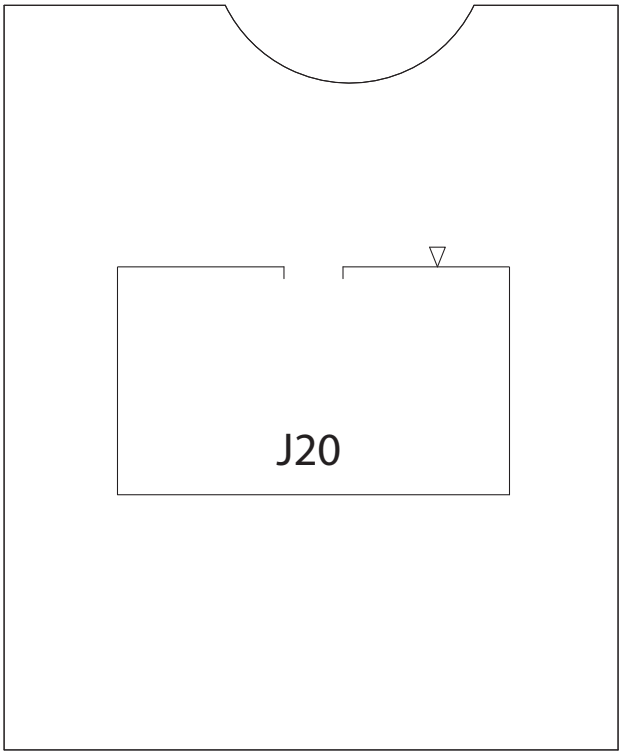


Figure 7-150 BVIV Power LED Front Panel Module (bottom) Rev 2

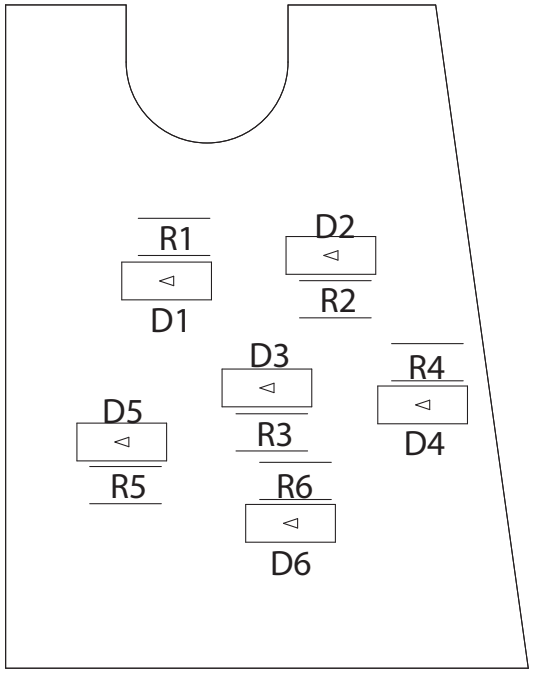


Figure 7-151 BVIV Power LED Front Panel Module (top) Rev 3

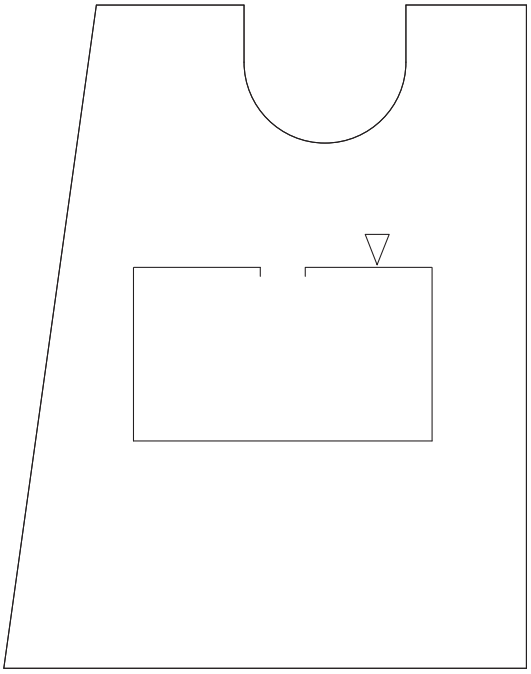


Figure 7-152 BVIV Power LED Front Panel Module (bottom) Rev 3

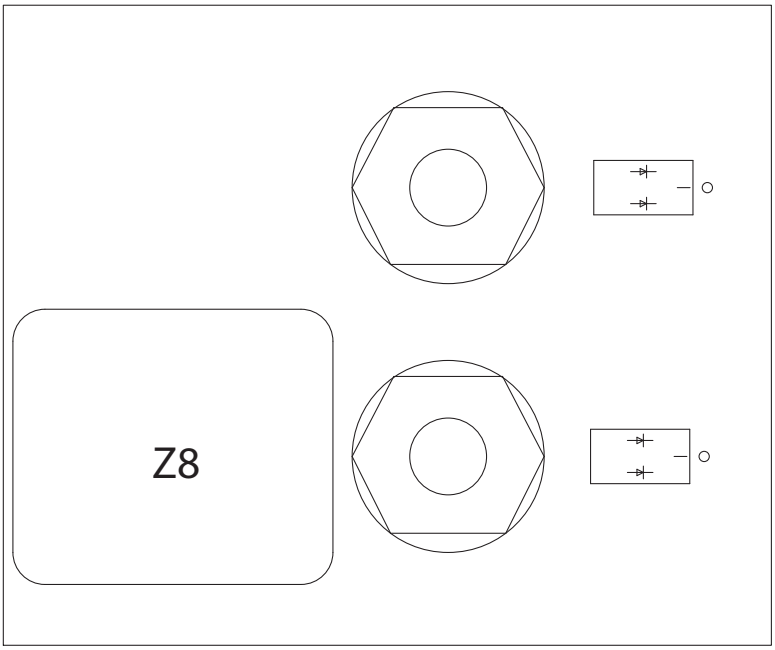


Figure 7-153 BZFP Bluetooth Front Panel Module (top) Rev 0

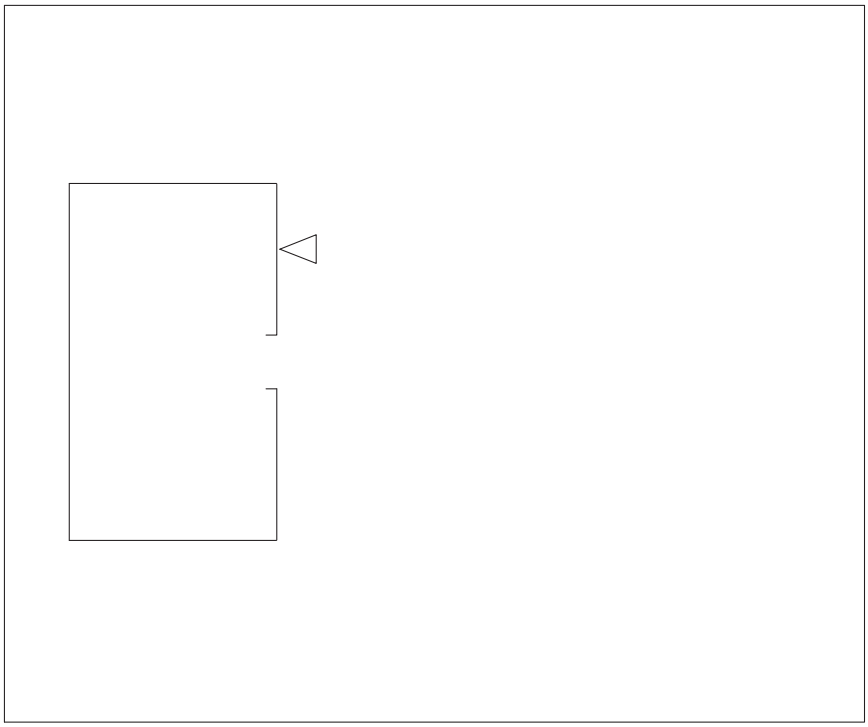


Figure 7-154 BZFP Bluetooth Front Panel Module (bottom) Rev 0

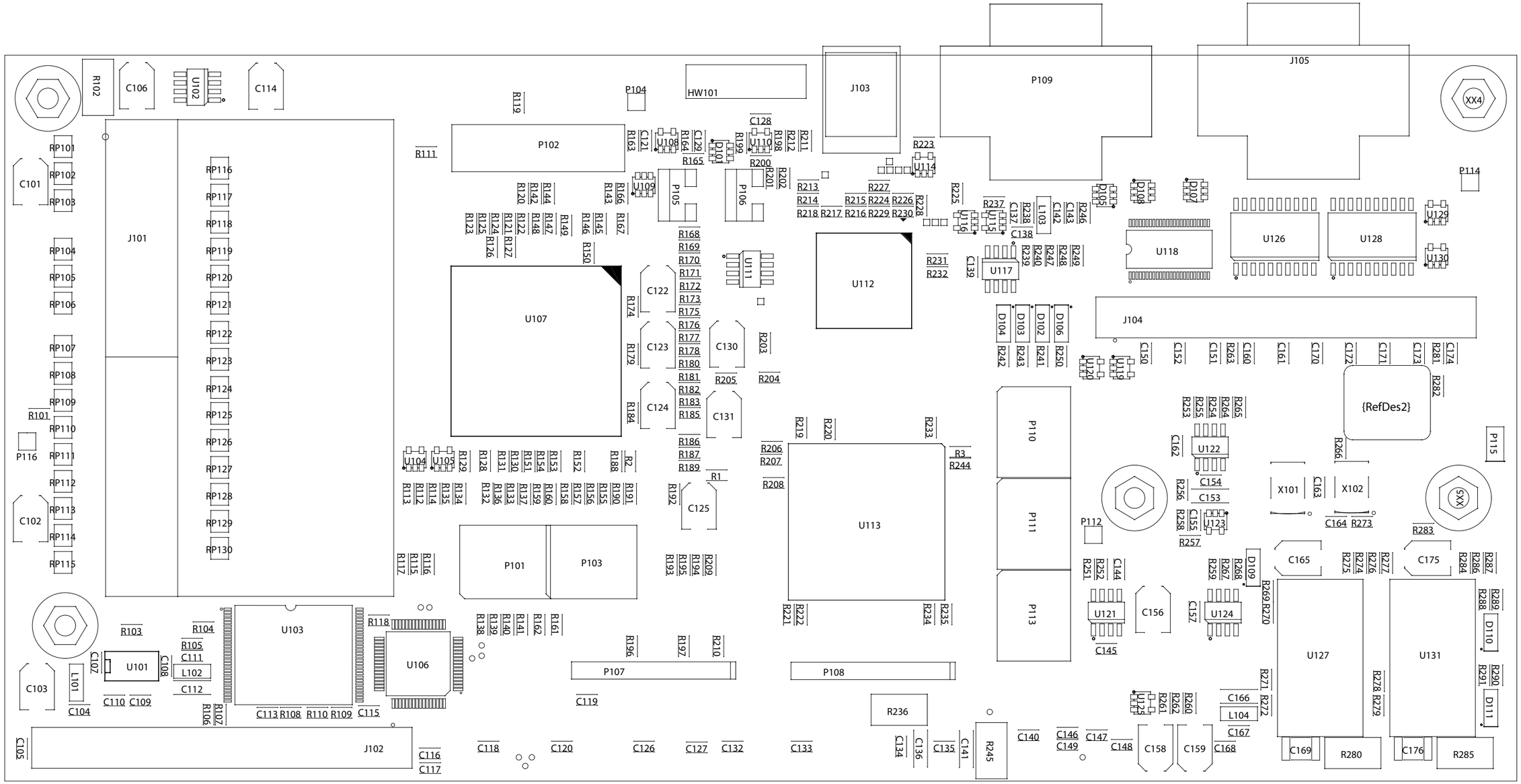


Figure 7-155 BZOD CPU / USB Module (top) Rev 0

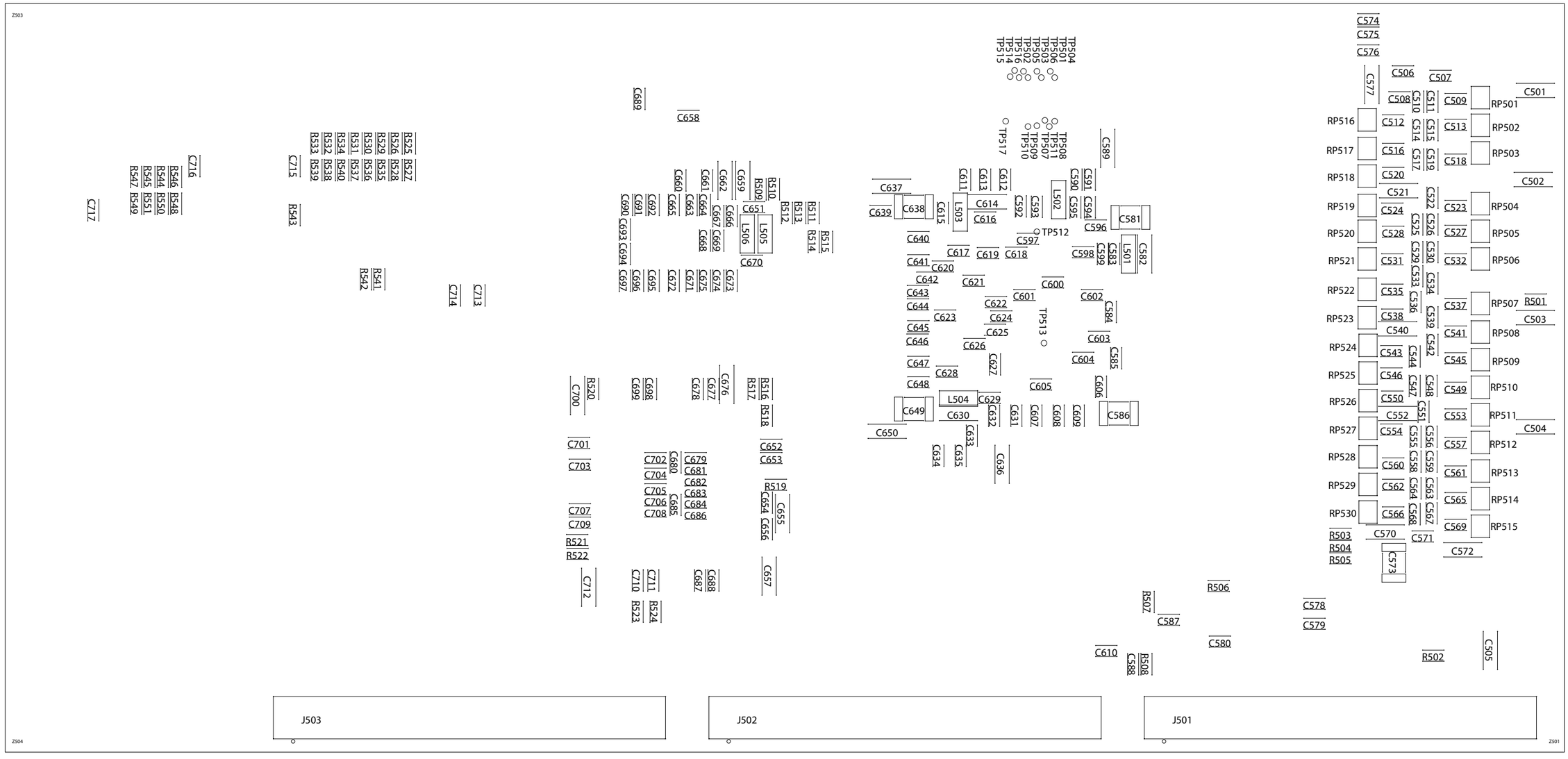


Figure 7-156 BZOD CPU / USB Module (bottom) Rev 0

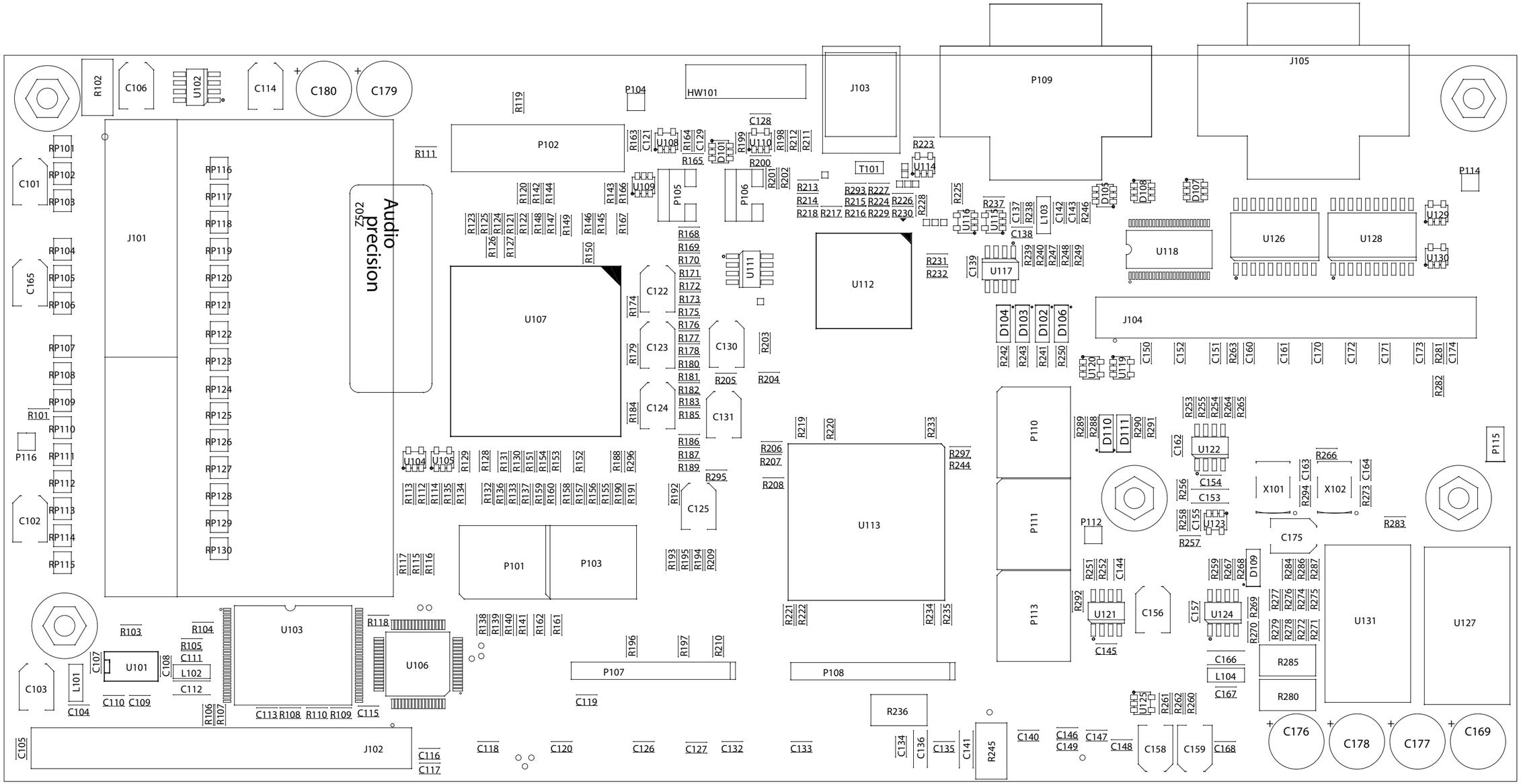


Figure 7-157 BZOD CPU / USB Module (top) Rev 1

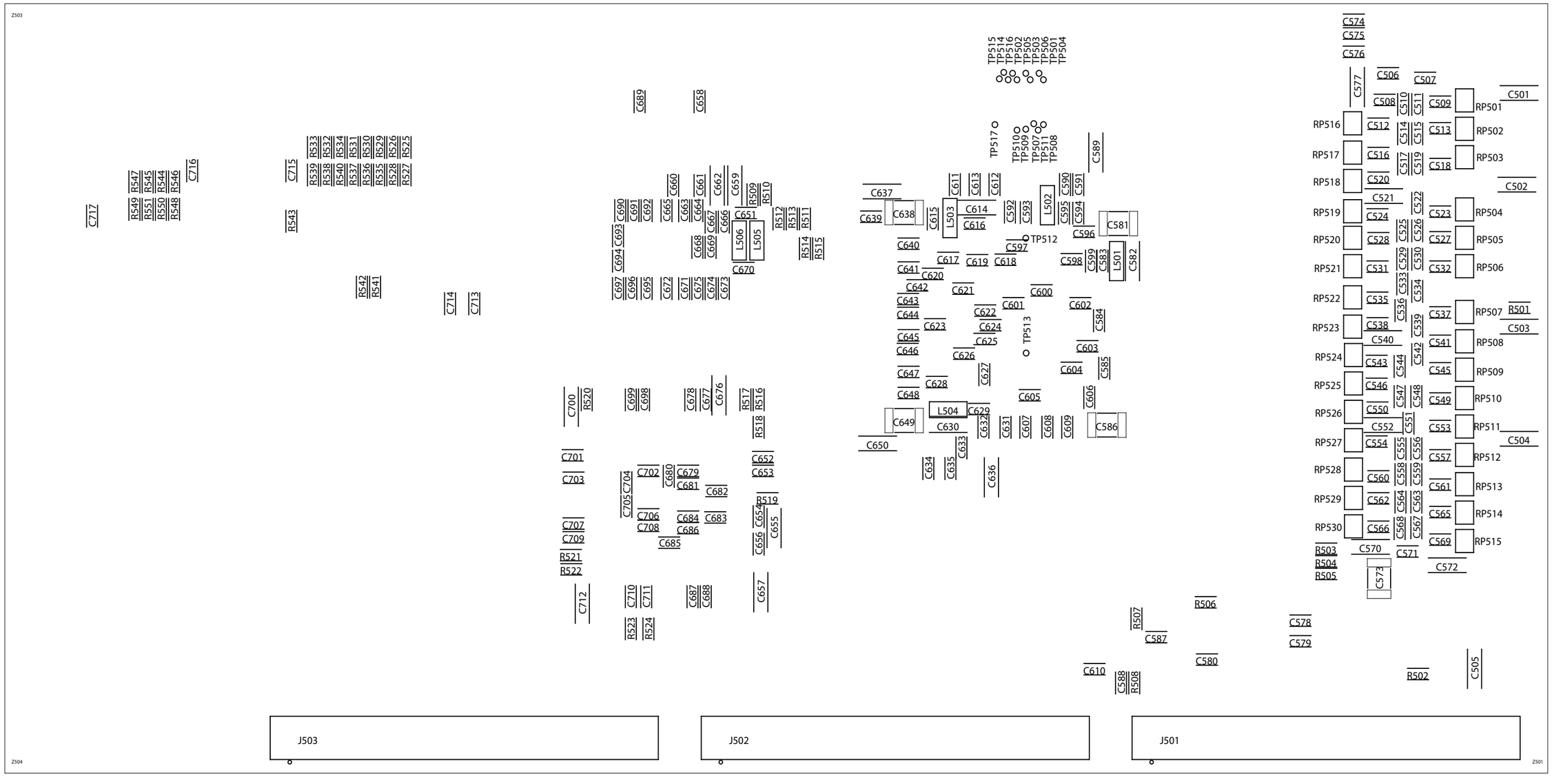


Figure 7-158 BZOD CPU / USB Module (bottom) Rev 1

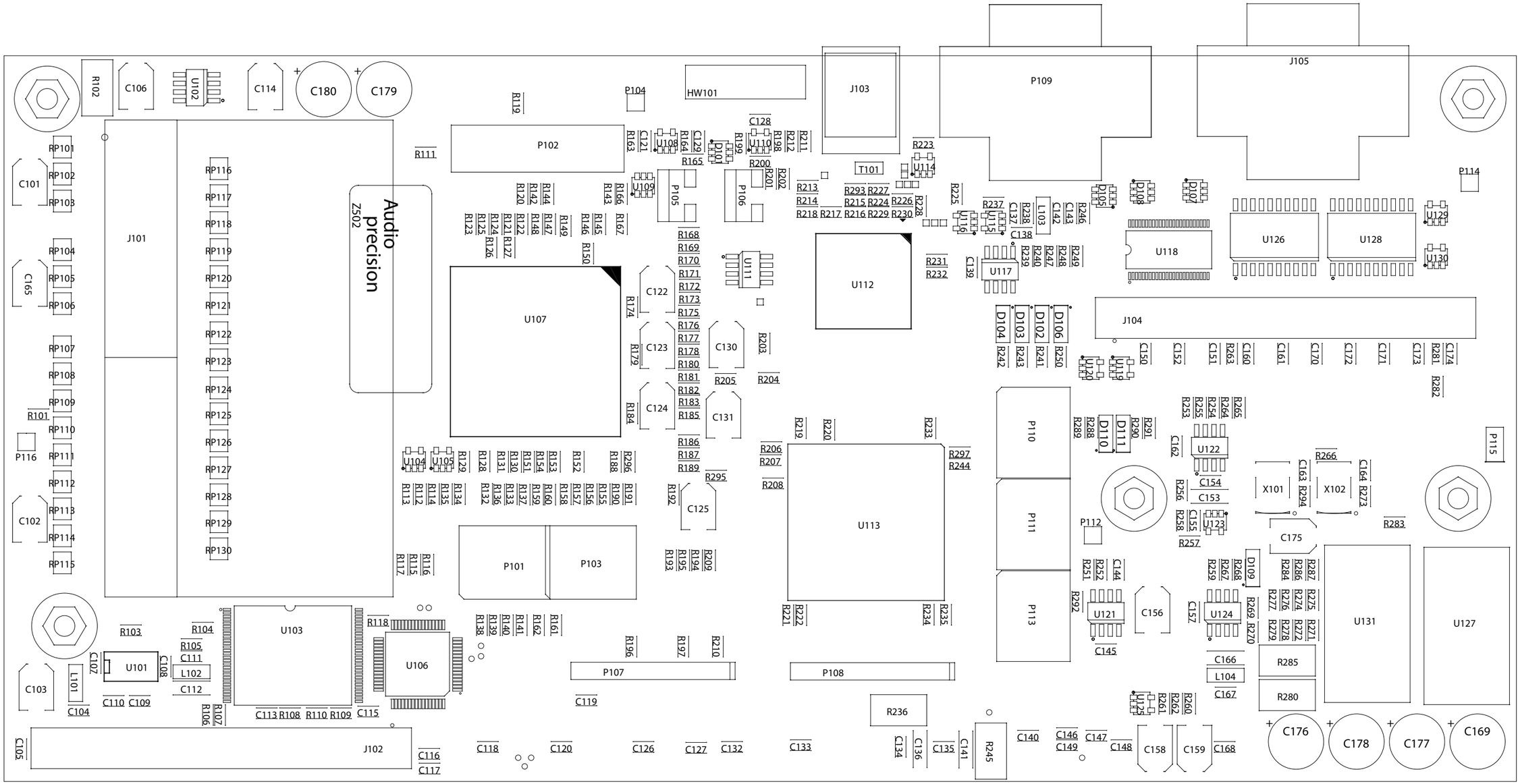


Figure 7-159 BZOD CPU / USB Module (top) Rev 2

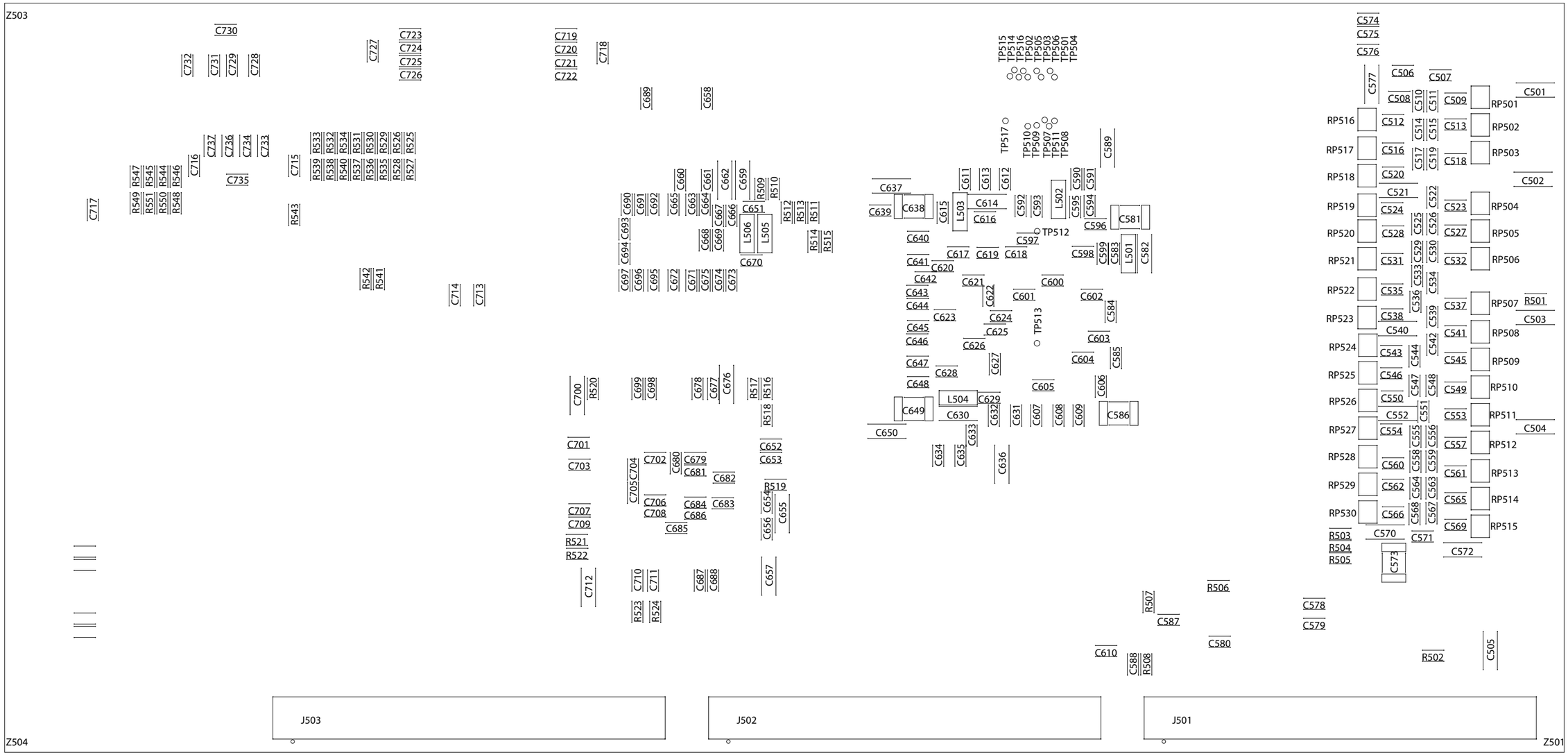


Figure 7-160 BZOD CPU / USB Module (bottom) Rev 2

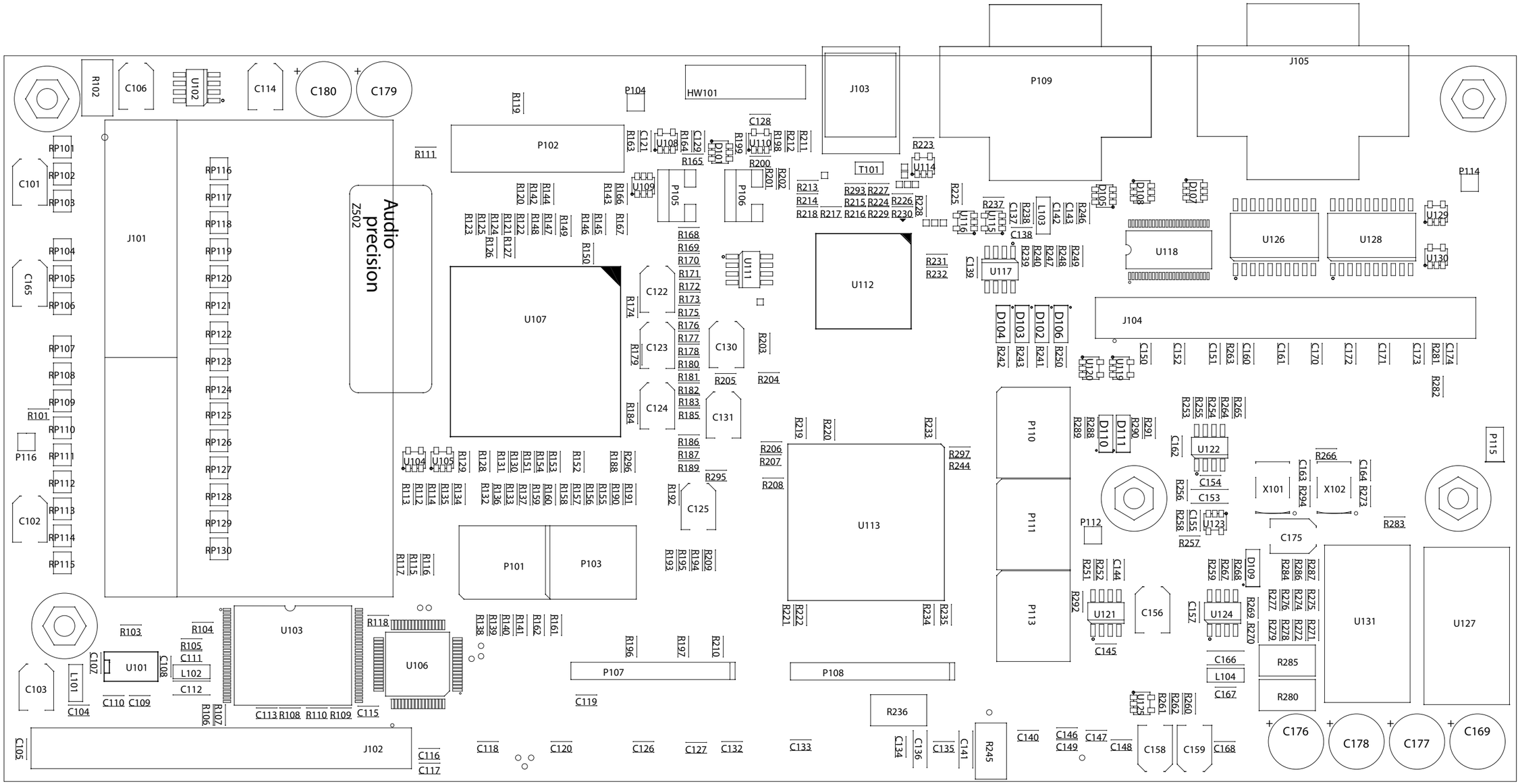


Figure 7-161 BZOD CPU / USB Module (top) Rev 3

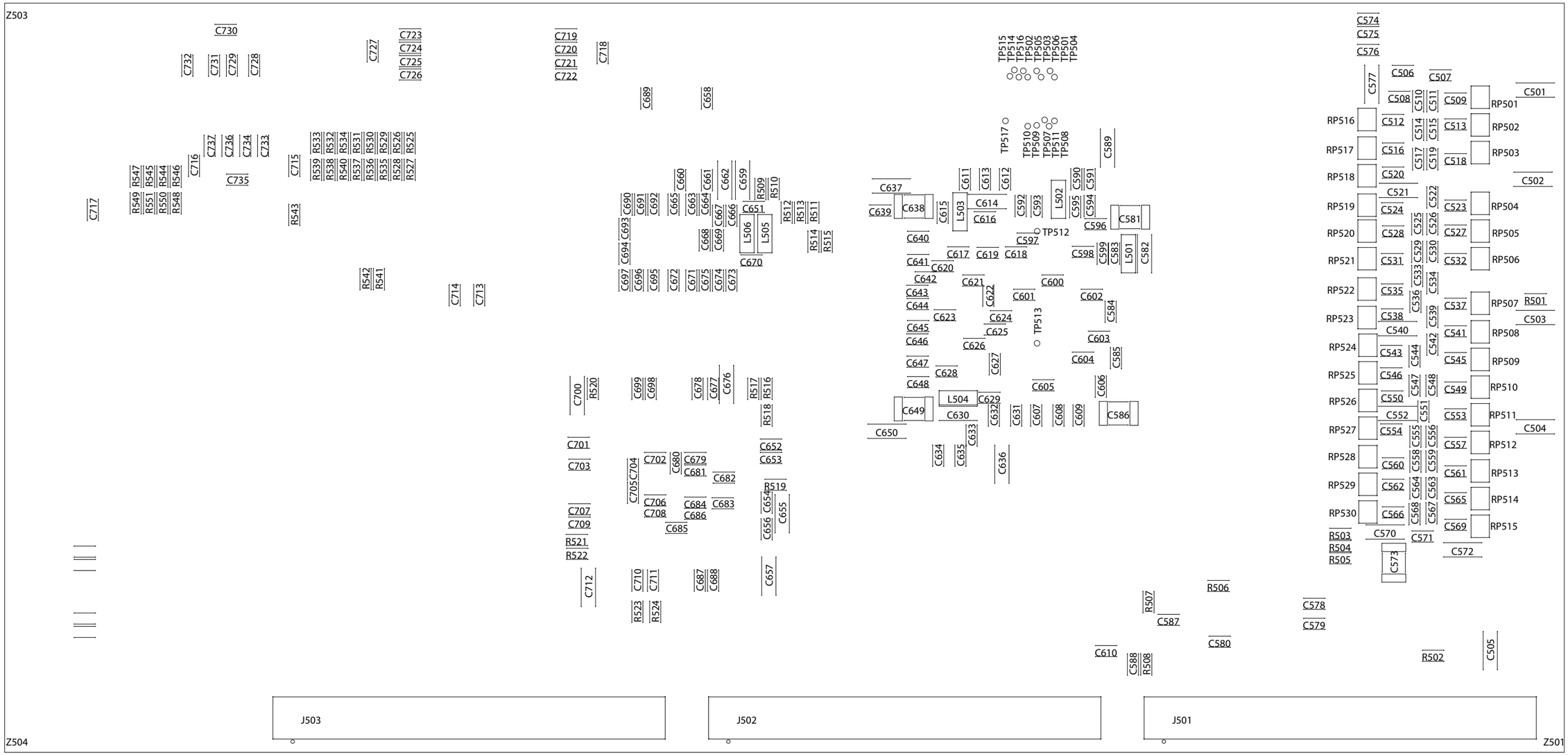
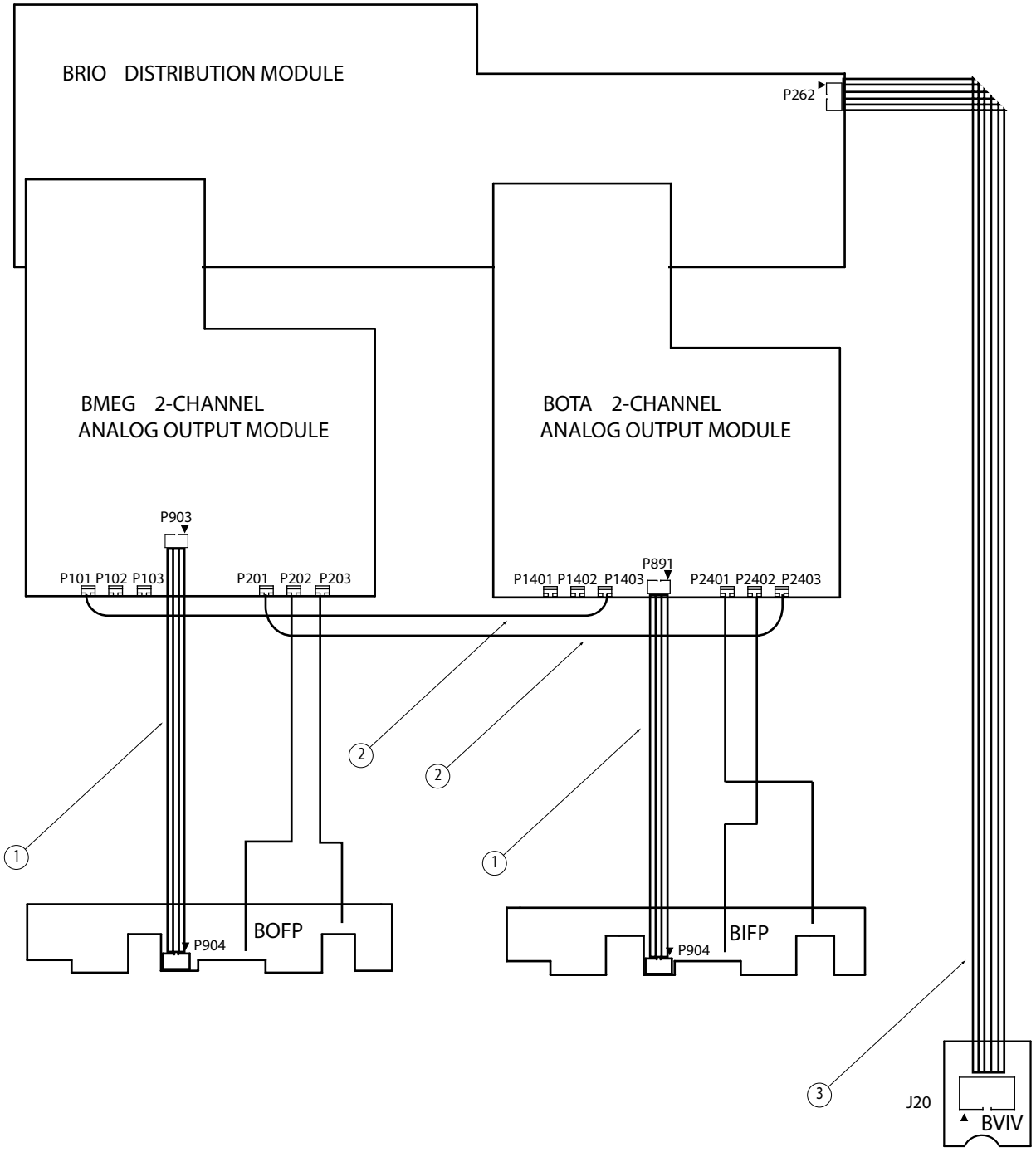


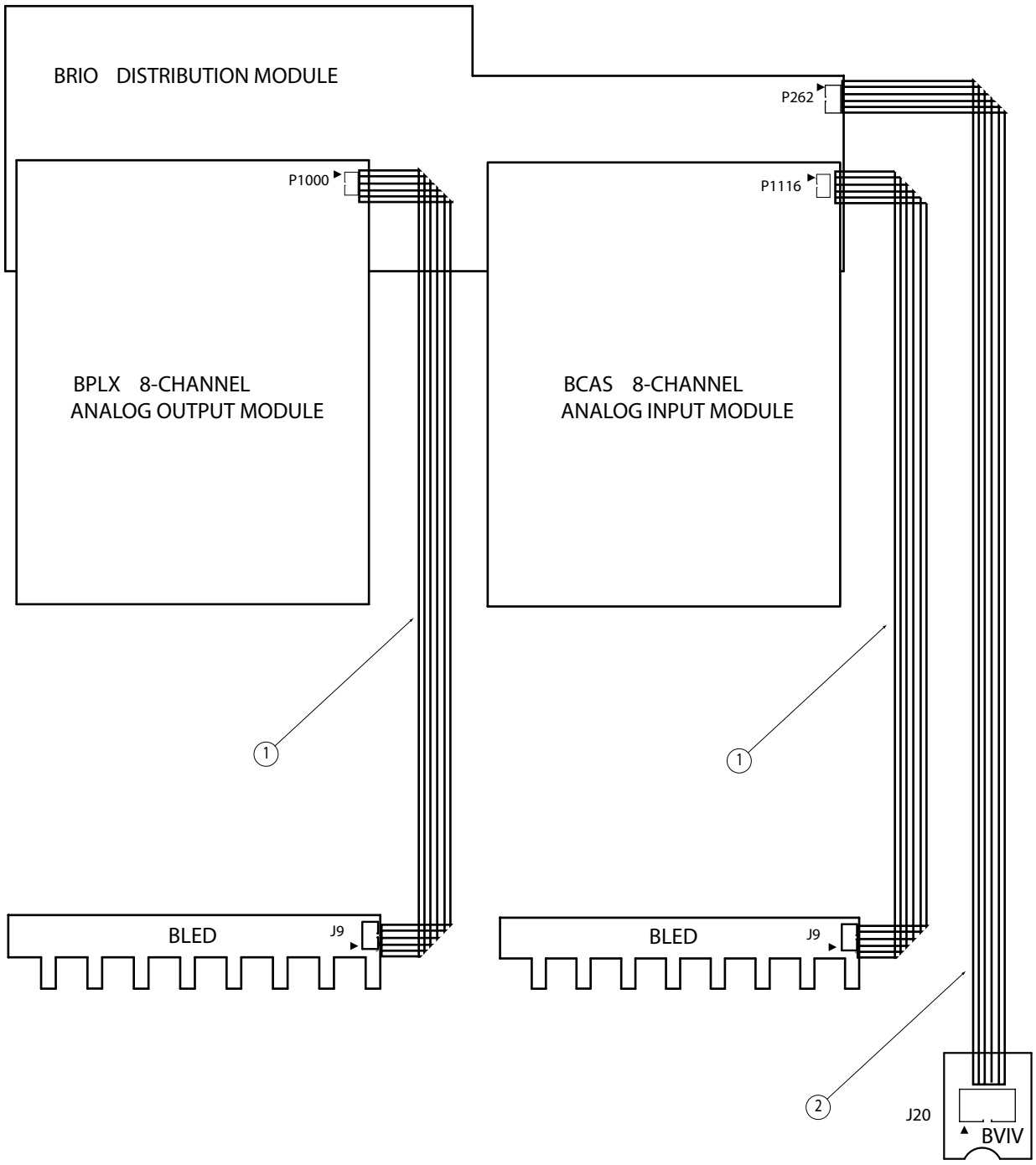
Figure 7-162 BZOD CPU / USB Module (bottom) Rev 3



Interconnect Cables (2-chan)

ITEM	PART NO	DESCRIPTION	QTY
1	4151.1003	CABLE ASSY RIBBON 3" 10-COND	2
2	4132.0135	CABLE ASSY SHLD 13.5" 3-PIN	2
3	4151.1014	CABLE ASSY RIBBON 14" 10-COND	1

Figure 7-163 Board Cable Interconnections (2-chan)



Interconnect Cables (8-chan)

ITEM	PART NO	DESCRIPTION	QTY
1	4151.1011	CABLE ASSY RIBBON 11" 10-COND	2
2	4151.1014	CABLE ASSY RIBBON 14" 10-COND	1

Figure 7-164 Board Cable Interconnections (8-chan)

Section 8: APx515

8.1 Introduction

This section only covers details exclusive to the APx515 analyzer. For general servicing guidance, please refer to the main sections of this service manual.

8.2 Functional Modules

8.2.1 BXAN Main Module

Contains the analog and digital I/O, DSP, system clock, and all other circuitry except for the CPU and USB interface.

8.2.2 BZOD CPU / USB Module

Contains the CPU and the USB interface that carries communications between the APx instrument and the PC running the APx500 measurement software.

8.3 Mechanical Diagrams

See pages 8-5 – 8-7.

8.4 Adjustments

Use the CAB-525 cable set (see the chart in Section 4.6) or equivalent. See page 8-9 in this section for adjustment and test point locations. See Section 4 for general adjustment information and for instructions on installing and running the Adjustment project.

8.5 Self Test

Refer to Section 5 for instructions on installing and running the Self Test.

8.6 Maintenance and Repair

8.6.1 Disassembly/Reassembly

Tools Needed:

#2 Phillips screwdriver

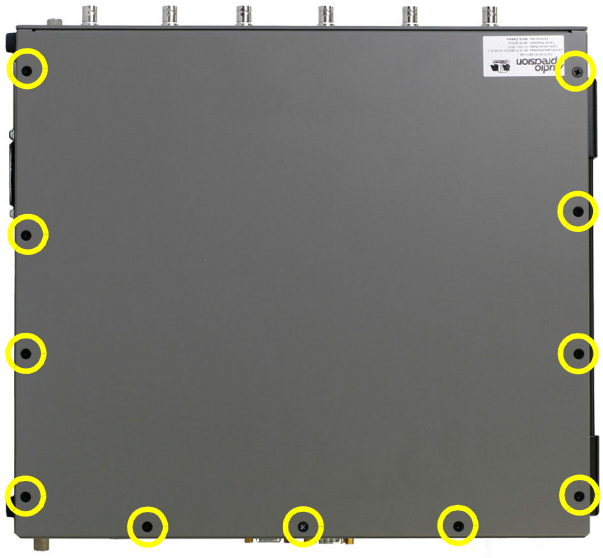
Medium flat blade screwdriver

Small flat blade screwdriver

Caution: Perform disassembly and assembly in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

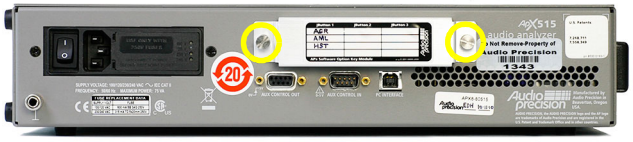
1) Disconnect the AC mains cord from the instrument.

2) Using a #2 Phillips screwdriver, remove the eleven 6-32 x 1/4" black screws that secure the top cover to the APx515 instrument.



3) Using a #1 Philips screwdriver, remove the three 4-40 x 1/4" black screws that secure the top cover to the APx515 front panel. The top cover can now be removed and set aside in a safe place.

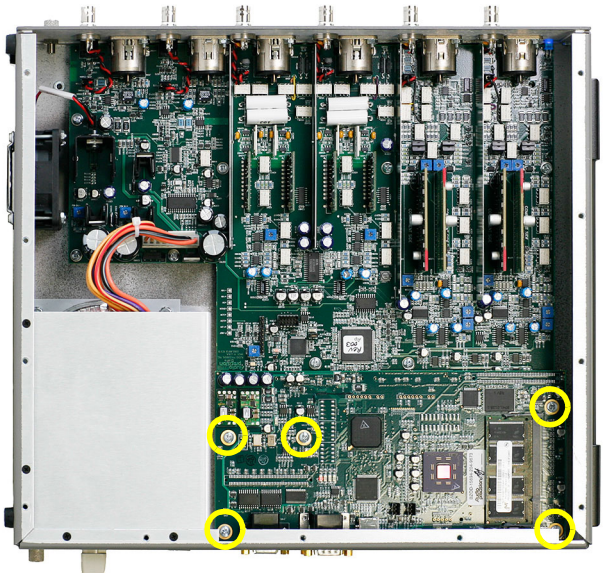
4) Remove the APx Software Option Key module by unscrewing the two thumb screws that secure it to the APx515 rear panel. If the thumb screws are too tight, a flat blade screw driver will need to be used to remove the thumb screws. The module is mated to the APx515 rear panel by a 9-pin D-sub connector. Gently pull the module to disconnect it, and set it in a safe place.



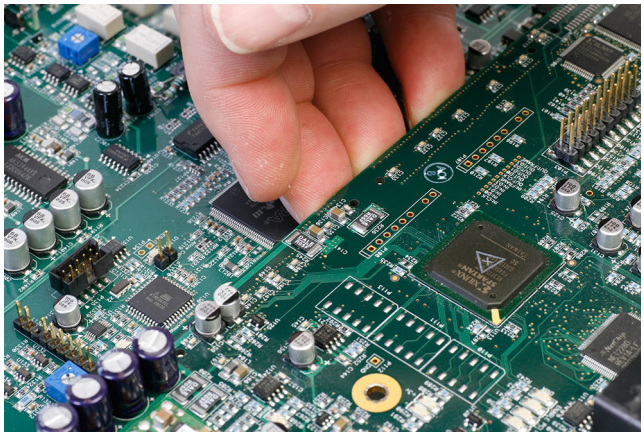
5) Using a 3/16" socket driver, unscrew the six 3/16" jack screws that secure the three 9-pin D-sub connectors to the rear panel.

Removing the BZOD Module

6) Using a #2 Philips screwdriver, remove the five 6-32 by 1/4" screws that secure the BZOD module to the chassis.



7) With your fingers, gently pry up the BZOD module where it plugs into the BXAN module to disconnect it. Lift the BZOD module out of the chassis and set the module aside on an ESD safe surface.

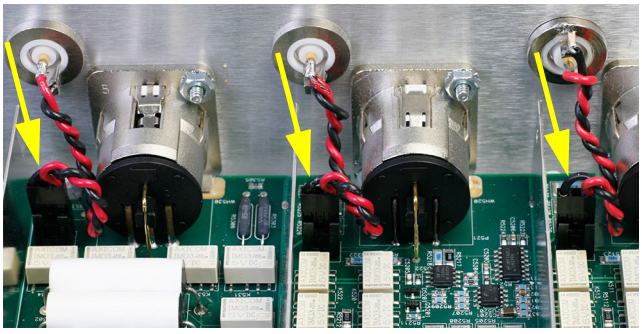


Removing the BXAN Module

8) Unlock the XLR connector bodies from the connector shells by inserting a small flat blade screwdriver into the slot in each XLR connector and turning counter clockwise.

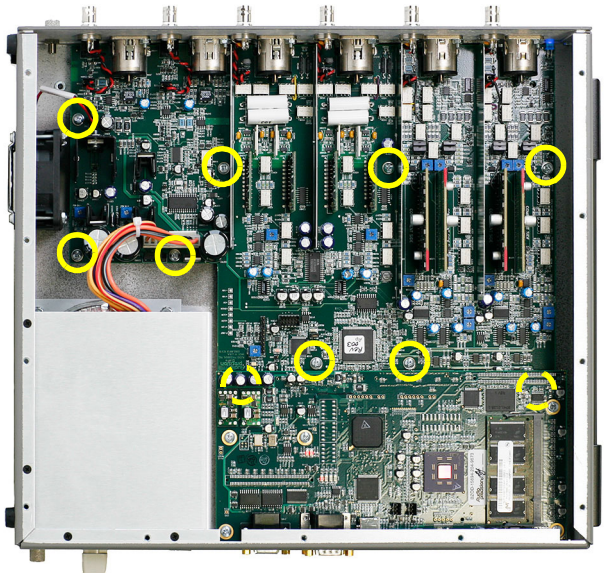
9) Using a #1 Phillips screwdriver, remove the two 4-40 x 1/4" screws that secure the AES Digital Optical Out and Optical In connectors to the APx515 front panel.

10) Using your fingers, gently disconnect the plugs that attach to the front panel BNC connectors to the BXAN module.

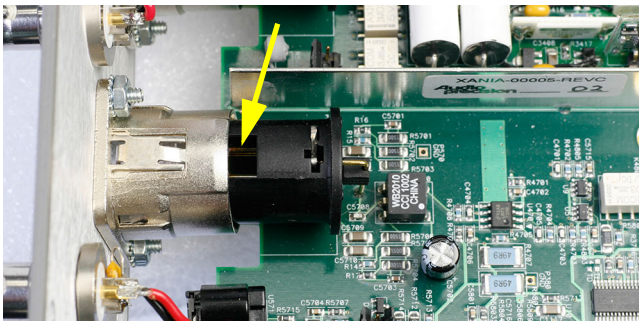


11) Disconnect the power transformer and fan connector from the BXAN module.

12) Using a #2 Philips screwdriver, remove the ten 6-32 x 1/4" screws that secure the BXAN module to the APx515 chassis.



13) Slide the BXAN module towards the rear of the chassis until the XLR connector bodies are clear of the connector shells. Lift out the BXAN module and set it in on an ESD safe surface.



APx515 Reassembly

1) Slide the BXAN module into the six XLR connector shells.

2) Lock the XLR connector bodies to the connector shells by inserting a small flat blade screwdriver into the slot in each XLR connector and turning clockwise.

3) Using a #1 Philips screwdriver, reinstall the two 4-40 x 1/4" screws that secure the AES digital optical out and optical in connectors to the front panel.

4) Using a #2 Philips screwdriver, reinstall the ten 6-32 x 1/4" screws that secure the BXAN module to the chassis.

5) Reconnect the power transformer and fan connectors to the BXAN Module. The connectors are polarized to prevent improper insertion.

6) Reconnect the six plugs that attach to the front panel BNC connectors to the BXAN module. The BNC connectors are polarized to prevent improper connection.

7) Place the BZOD module into the chassis so that it mates with the BXAN module. Gently press down with your fingers to fully seat the connectors.

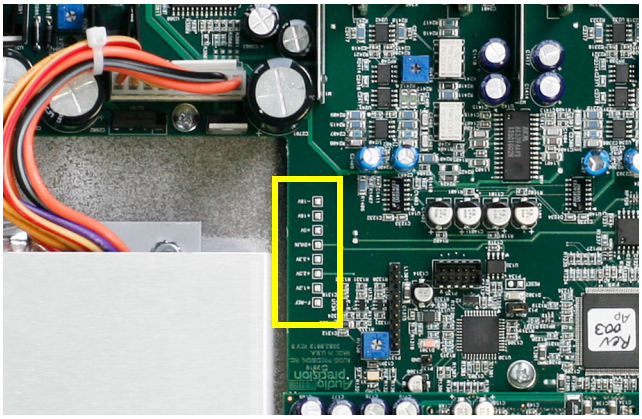
8) Using a 3/16" socket driver, reinstall the six 3/16" jack screws that secure the three 9-pin D-sub connectors to the rear panel.

9) Using a #2 Philips screwdriver, reinstall the five 6-32 by 1/4" screws that secure the BZOD module to the chassis.

10) Reinstall the APx Software Option Key module by mating the 9-pin connectors and tighten the two thumbscrews.

Power Supply Checks

With the top cover removed, apply AC mains power and turn on the power switch. Use a DC voltmeter with the negative lead connected to the chassis to check that the rail voltages are correct according to the following chart. The test points are on the BXAN module near the power transformer shield. Voltages can be measured with or without the BZOD module installed.

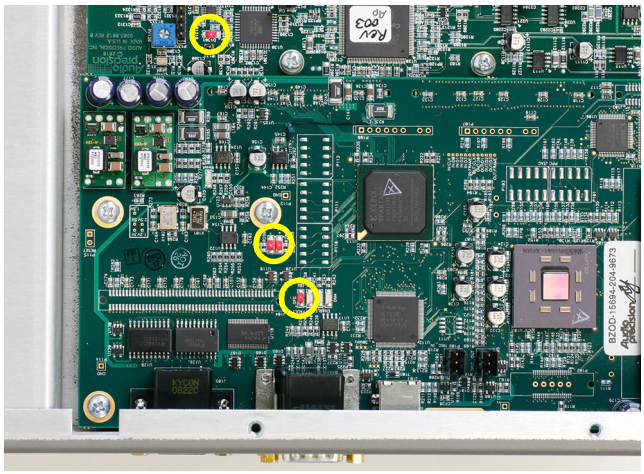


Voltage Rails

Test Point	Volts DC Value
+1.2 VDC	+1.1 to +1.3
+2.5 VDC	+2.4 to +2.6
+3.3 VDC	+3.2 to +3.4
+5 VDC (LIN)	+4.9 to +5.1
+5 VDC	+4.9 to +5.1
+16 VDC	+15.9 to +16.2
–16 VDC	–15.9 to –16.2

Start-up Checks

With the top cover removed, apply AC mains power and turn on the power switch. Observe that the three LEDs on the BZOD module are lit, and that the LED on the BXAN module is flashing at a slow rate.



8.7 Component Locations

For the BXAN module, see pages 8-11 – 8-14. For the BZOD module, see Section 7. The APx515 shares BZOD modules Rev 2 and later with other APx500 Series models.

Table 8-1: Chassis

Item	Part NO.	Description	Quan
1	5112.1108.7	SCREW FH PH SS BLK ZN TAPT 4-40 X 1/4	10
2	5113.1106.2	SCREW MCFLTPH BZ 6-32 X 3/16 UNDERCUT	11
3	7150.0515	COVER, TOP	1
4	BXAN.0000	APX515 MAIN BOARD ASSY	1
5	BZOD.0000	CPU BOARD ASSY	1
6	5113.7108	SCREW MC SEM PH ZN 6-32 X 1/4	15
7	BSWO.0000	SOFTWARE KEY MODULE	1
8	7160.0025	TRANSFORMER COVER	1
9	5115.4132	SCREW MC TRS PH ZN 10-32 X 1-1/4	1
10	5325.0001	WASHER LOCK #10	1
11	5315.0002	WASHER FLAT #10	1
12	4522.0021	TRANSFORMER, POWER TOROID	1
13	9PEM.0515	POWER ENTRY MODULE W GROUND WIRE	1
14	5113.1110.2	SCREW MC FLT PH BZ 6-32 X 5/16	2
15	5223.0000	NUT KEP 6-32 X 5/16	3
16	7110.0006	MOUNT TRAY XFMR	1
17	5532.1106.1	SCREW, JACK	6
18	4255.0002	JACK, BANANA GNDED KNURLED	1
19	7150.0510	CHASSIS, BOTTOM/SIDES	1
20	5112.3144	SCREW MC PAN PH ZN 4-40 X 1-3/8	4
21	7330.0015	FAN GUARD CHROME 60MM	1
22	5113.7108.2	SCREW MC SEM PH BZ 6-32 X 1/4	8
23	5630.0006	FEET BLACK .25 X .5 POLYASTERMER	8
24	7321.0013	GASKET SET 60MM FAN (INCL WASHERS)	1
25	4801.0515	FAN 60MM	1
26	5222.0001	NUT KEP 4-40	4
27	4253.0012	JACK XLR PC MT RA NKL FEMALE (ON BXAN.0000)	3
28	4253.0011	JACK XLR PC MT RA NKL MALE (ON BXAN.0000)	3
29	5515.0188	STANDOFF RND ALUM 10 X 3/16	2
30	5810.0002	HANDLE STRAP BLACK	1
31	7310.0028	BRACKET HANDLE	2
32	5115.1116.2	SCREW MC FLT PH BZ 10-32X1/2	2

	BFPM.0515	FRONT PANEL ASSY	1
33	7130.0515	PANEL, FRONT	1
34	5112.1108.7	SCREW FH PH SS BLK ZN TAPT 4-40 X 1/4	9
35	5222.0001	NUT KEP 4-40	12
36	4151.0402	CABLE ASSY 600V 2 WIRE 3.5" 2C	1
37	4254.0014	JACK, BNC ISOLATED PNL MNT 50 OHM	6
	2172.0223	CAP, CERAMIC 200V 20% 22NF AXIAL (ANALOG I/O)	4
	4120.2000	WIRE 20AWG 1FT (DIGITAL I/O)	1
38	4255.0002	JACK, BANANA GNDED KNURLED	1
39	5325.0002	WASHER LOCK	6
40	5241.0001	NUT JAM	6

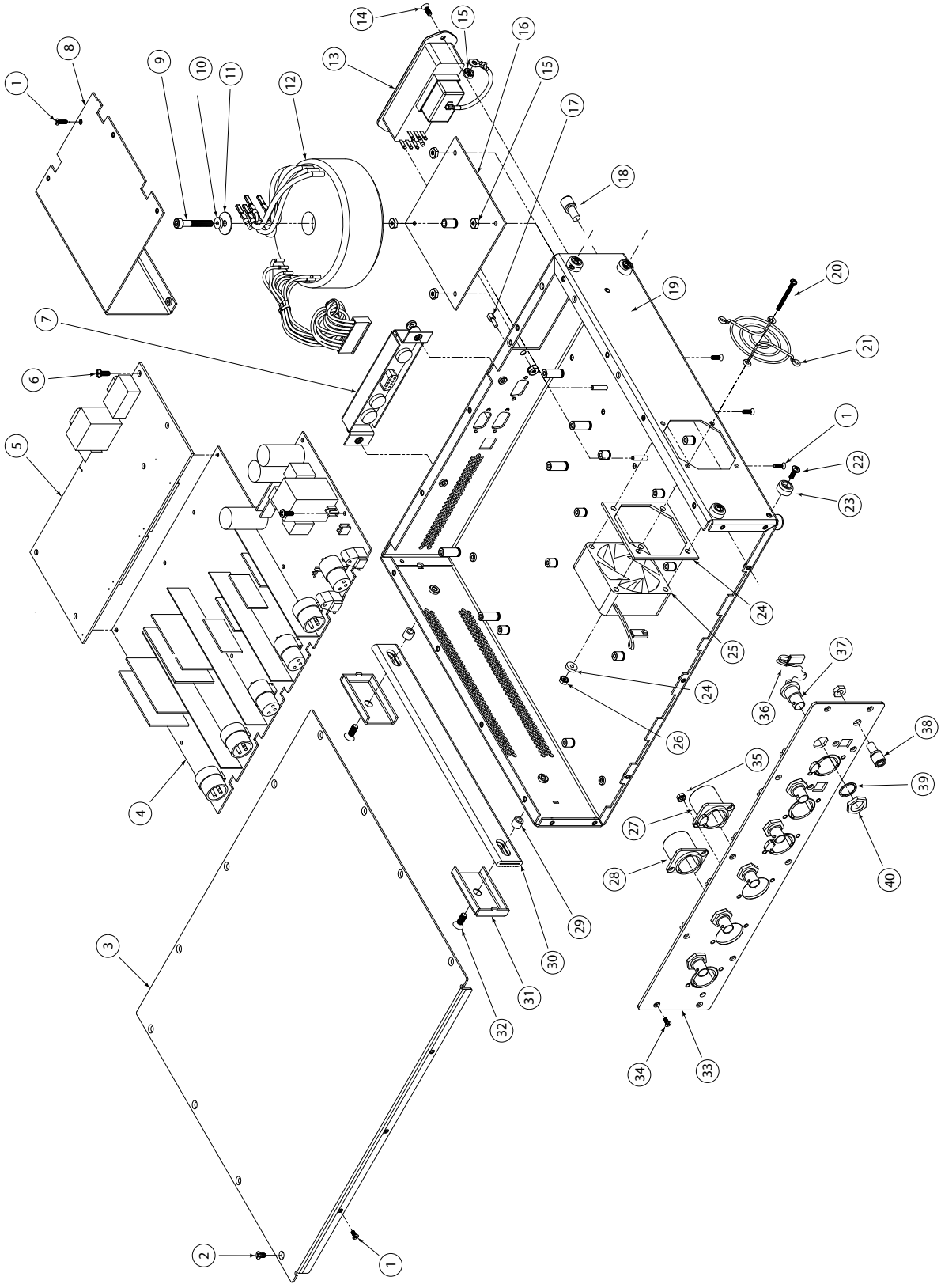


Figure 8-1 APx515 Chassis

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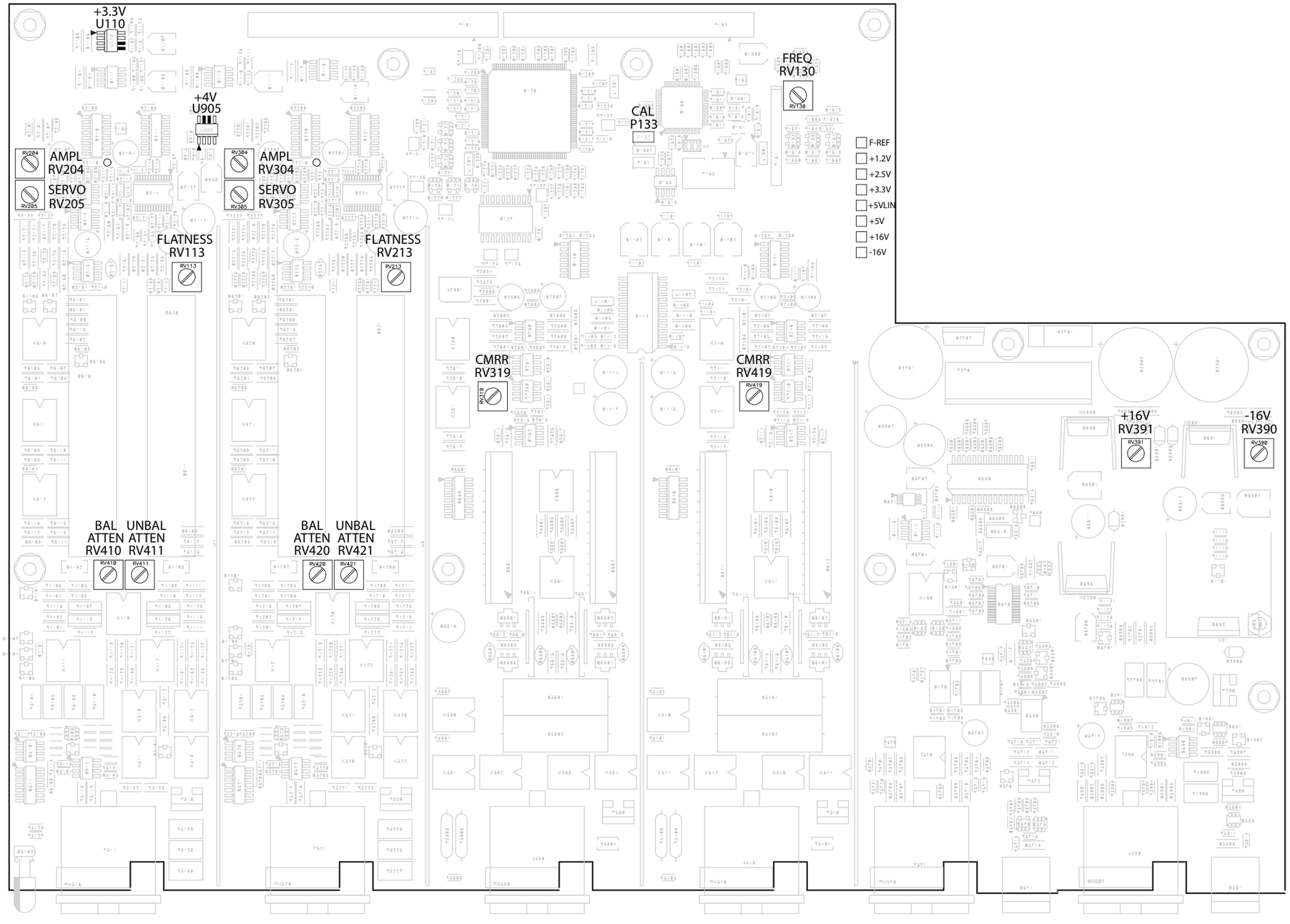

Figure 8-2 BXAN APx515 Main Module Adjustment Locations

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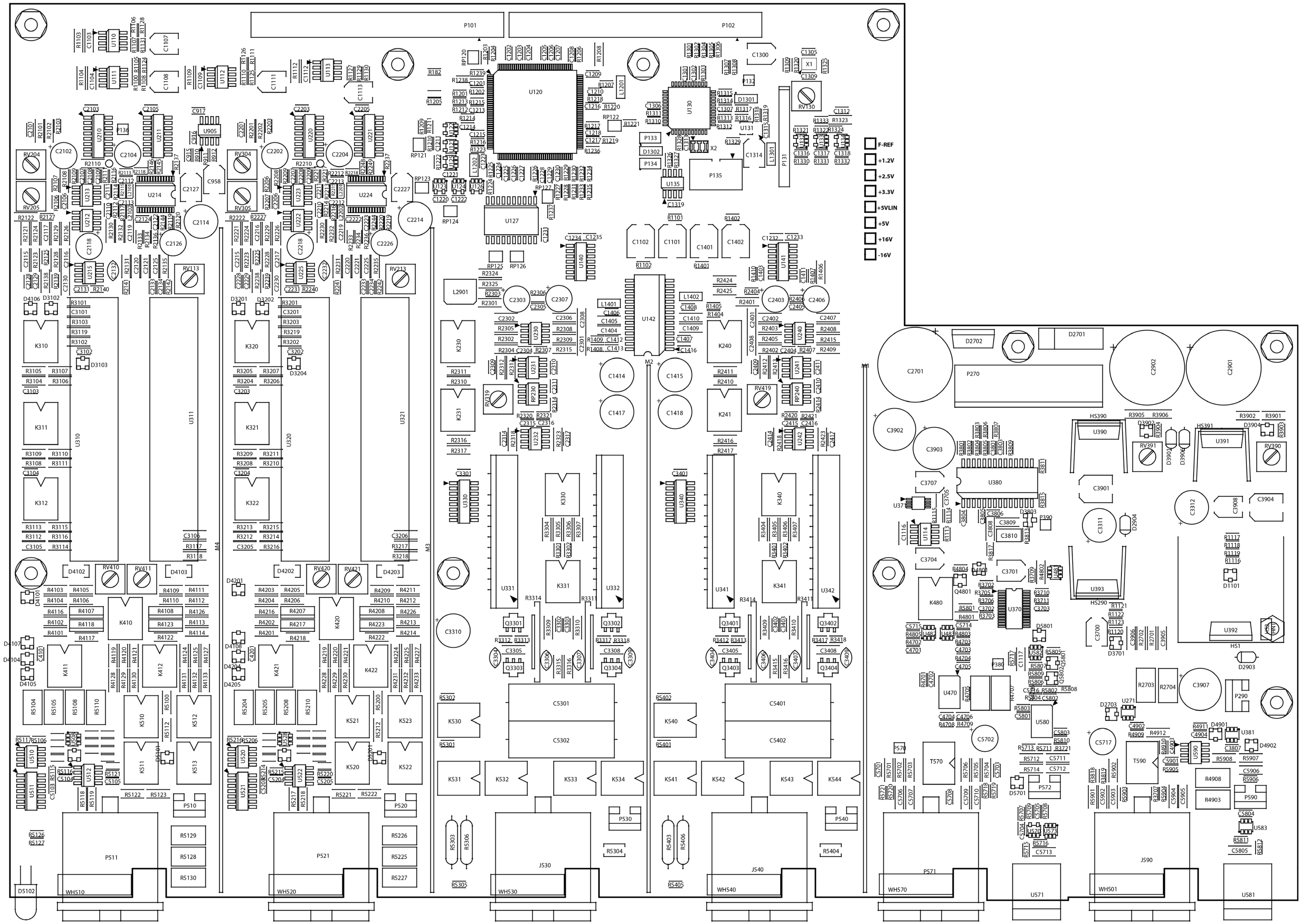


Figure 8-3 BXAN APx515 Main Module Rev 0

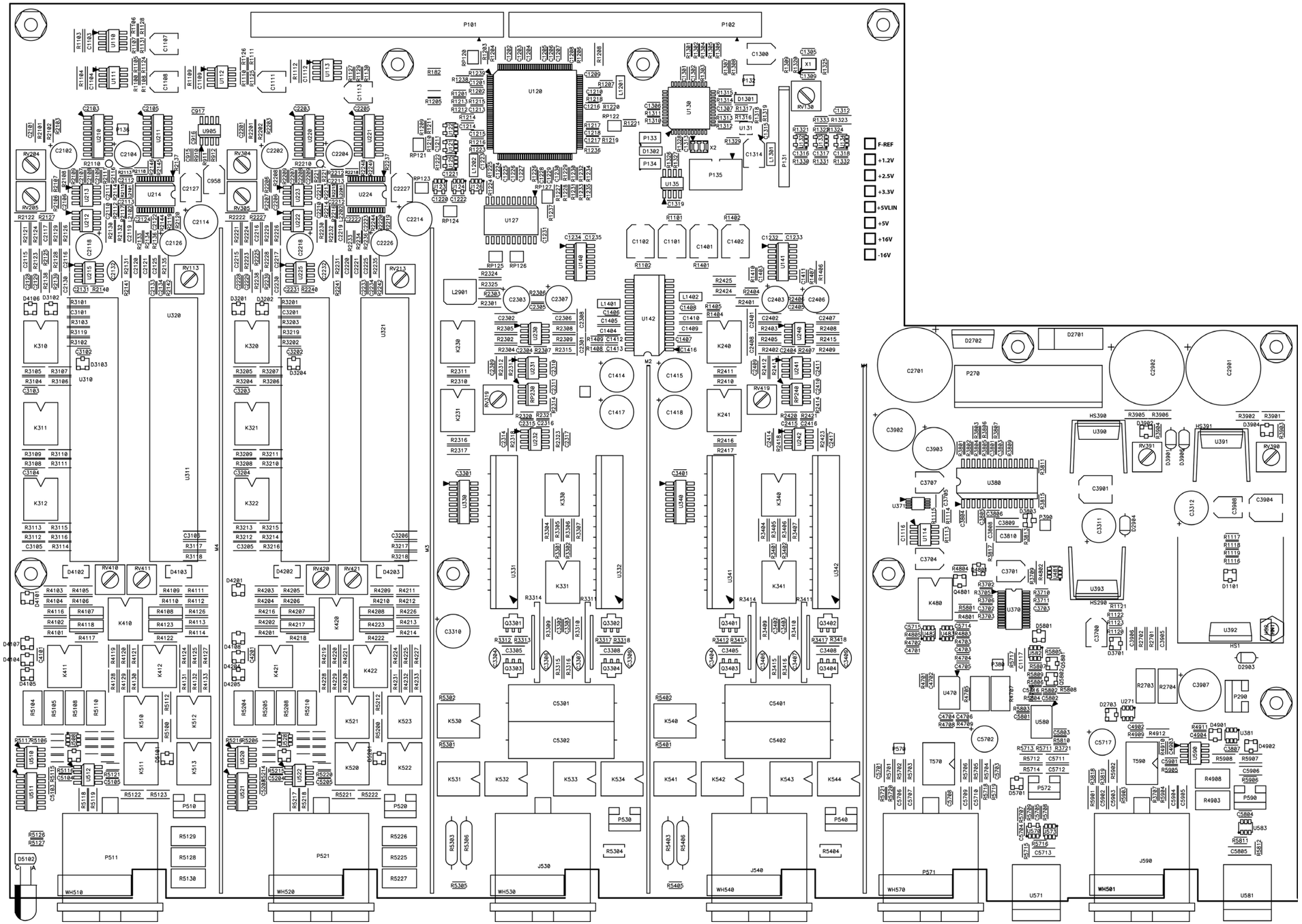


Figure 8-4 BXAN APx515 Main Module Rev 1

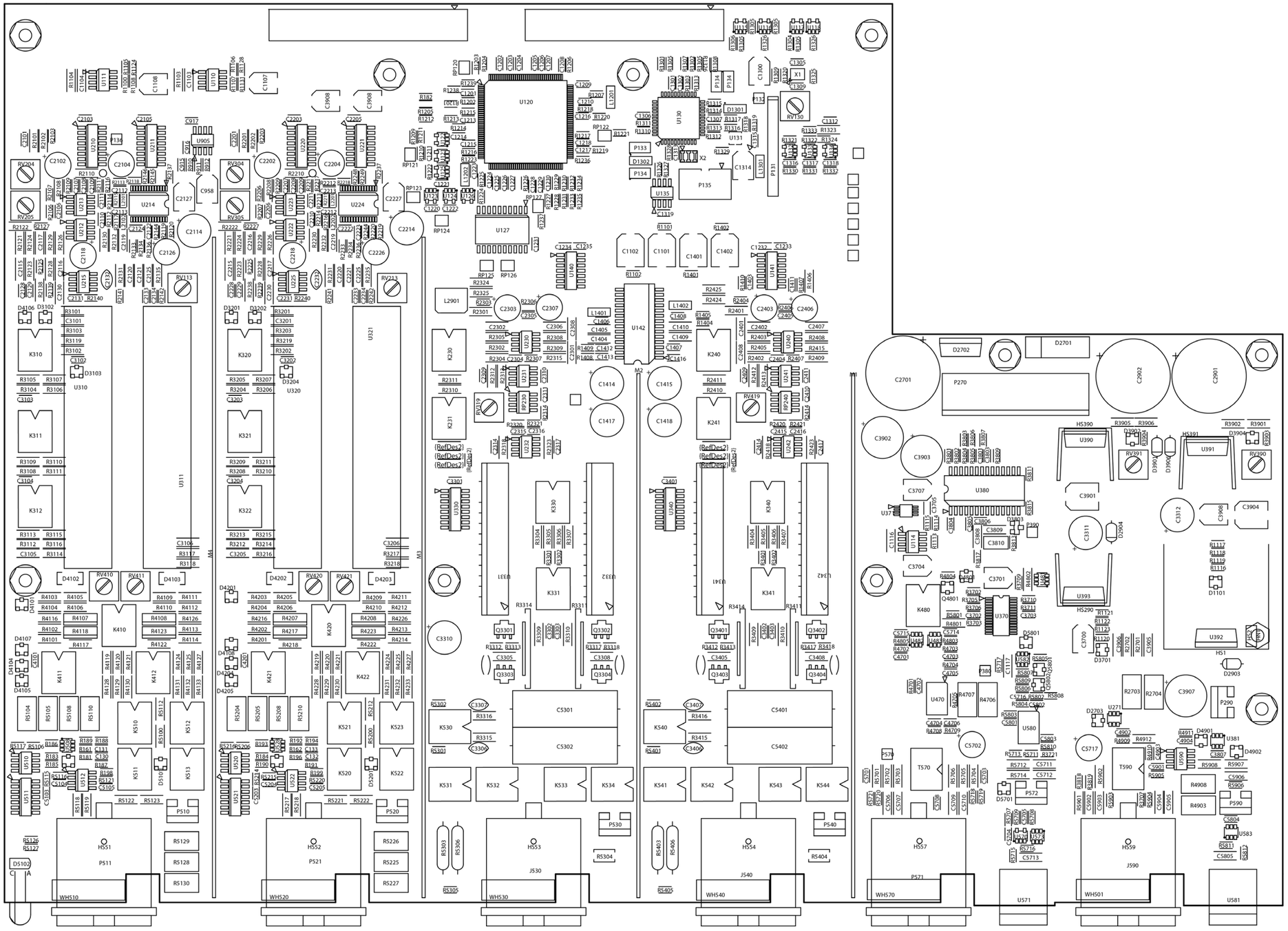


Figure 8-5 BXAN APx515 Main Module Rev 2

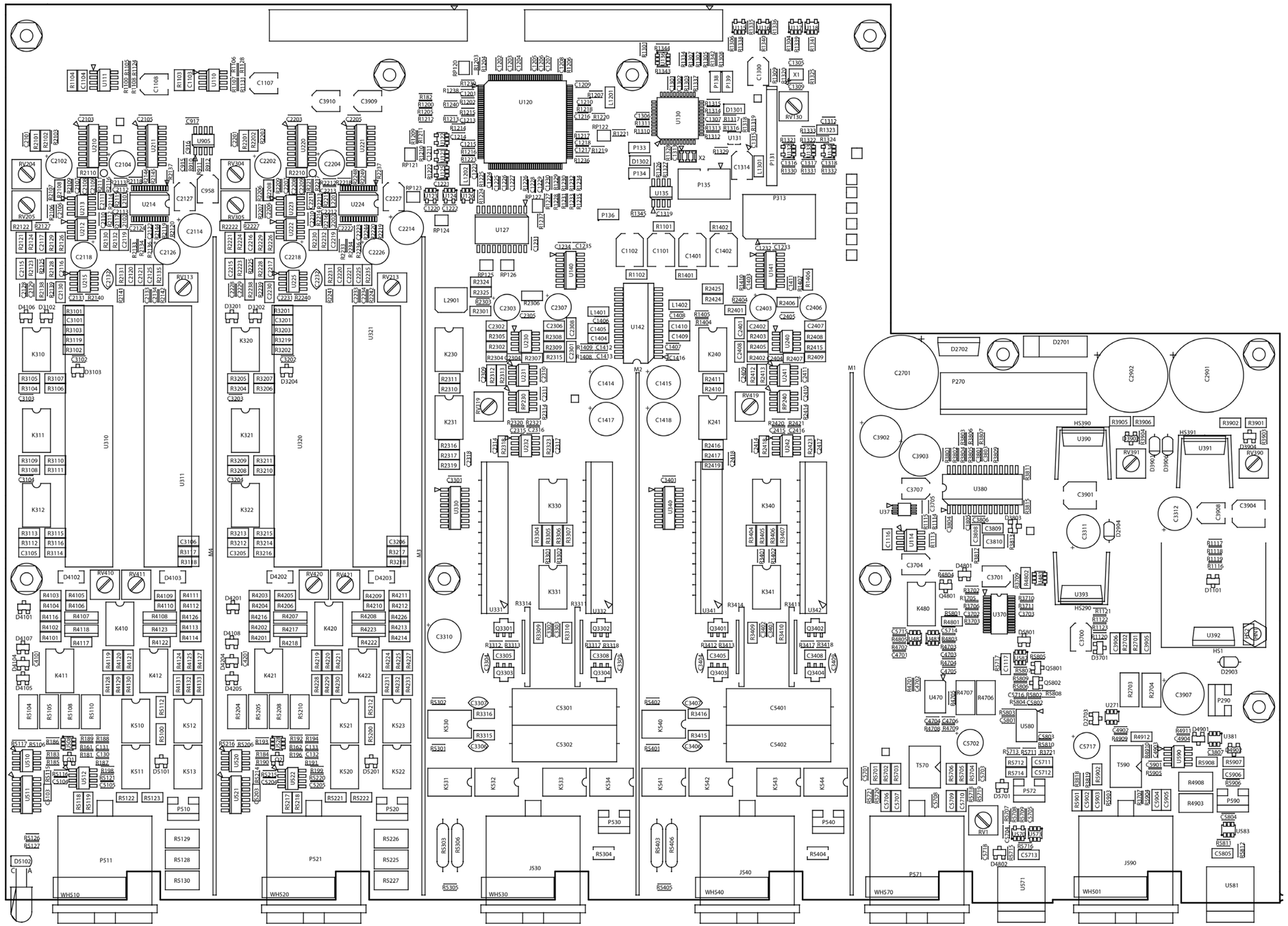


Figure 8-6 BXAN APx515 Main Module Rev 3

Section 9: APx1701 Transducer Test Interface

9.1 Introduction

This section covers only the APx1701 Transducer Test Interface. The APx1701 features a two-channel low-distortion instrument-grade power amplifier combined with microphone power supplies, TEDS reading capability and impedance-measurement circuits, for electro-acoustic testing of loudspeakers and headphones.

For general servicing guidance, please refer to main sections of this service manual. Information specific to the APx1701 follows here.

9.2 Functional Modules

9.2.1 ATTN Power Amplifier Module

This module contains both channels of the analog power amplifier circuitry and the heat sink assembly.

9.2.2 ASRN USB Interface / Mic I/O

This module contains the USB control interface that carries communications between the APx1701 amplifier and the APx500 control software. Included are the analog inputs to the power amplifier, plus CCP or phantom power supplies for the microphone pass-through feeds.

9.2.3 ADNE +48 Vdc, +5 Vdc supplies

This module contains +48V dc phantom power supply, and the +5 V dc USB interface power supply.

9.2.4 ARHE Mains power line filter

This module contains the mains line filter circuitry and the ac power feeds to the switching power supplies.

9.2.5 Switching dc power supplies

There are two switching power supplies manufactured by Mean Well USA that supply the plus and minus 48 V dc to the power amplifier module.

9.3 Mechanical Diagram

Page 9-9.

9.4 Component Locations

- System modules and interconnection, page 9-11.
- Titan (ATTN) power amplifier module, page 9-12.
- Saturn (ASRN) USB/ Audio I/O module, page 9-14.
- Rhea (ARHE) mains line filter module, page 9-15.
- Dionne (ADNE) +5 V and +48 V phantom power module, page 9-16.

9.5 Adjustment and Test Point Locations

See the first pages of Section 4 earlier in this Service Manual for general adjustment information and for instructions on installing and running Adjustment project(s).

- Mean Well switching power supply voltage adjustments, page 9-17.
- Saturn (ASRN) USB/ Audio I/O module, page 9-18.
- Titan (ATTN) power amplifier module, pages 9-19 and 9-20.

9.6 Self Test

The APx500 SelfTest.exe software found on the service disc includes a project to test the APx1701. The APx1701 Self Test kit SLFT-KIT-1701 is required to run this project; it contains a self test fixture and necessary cabling.

We recommend that this project be run before and after any service work is done to the instrument. The Self Test will prompt you to install the cable and test fixture as you proceed.

9.7 Maintenance and Repair

9.7.1 Disassembly and Reassembly

Tools Needed:

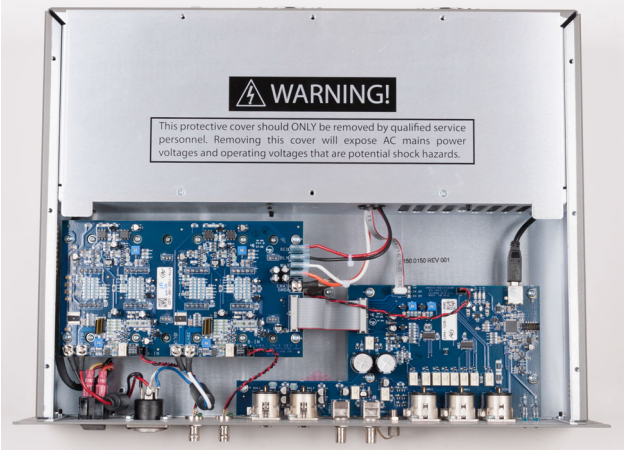
- #1 Phillips screwdriver
- #2 Phillips screwdriver
- #00 size flathead screwdriver Neutrik SD-1.
- 9/16" (15 mm) deep socket wrench.
- Needle-nose pliers
- Blunt-nose pliers

Caution: Perform disassembly and assembly in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded antistatic work mat and wrist strap.

1. Disconnect the ac mains power cord from the instrument.
2. Using a #2 Phillips screwdriver, remove the fourteen 6-32 x 3/8" black screws that secure the top cover to the APx1701 instrument.

APx1701 top cover screw locations.

3. The top cover can now be removed and set aside with the fasteners screws in a safe place.

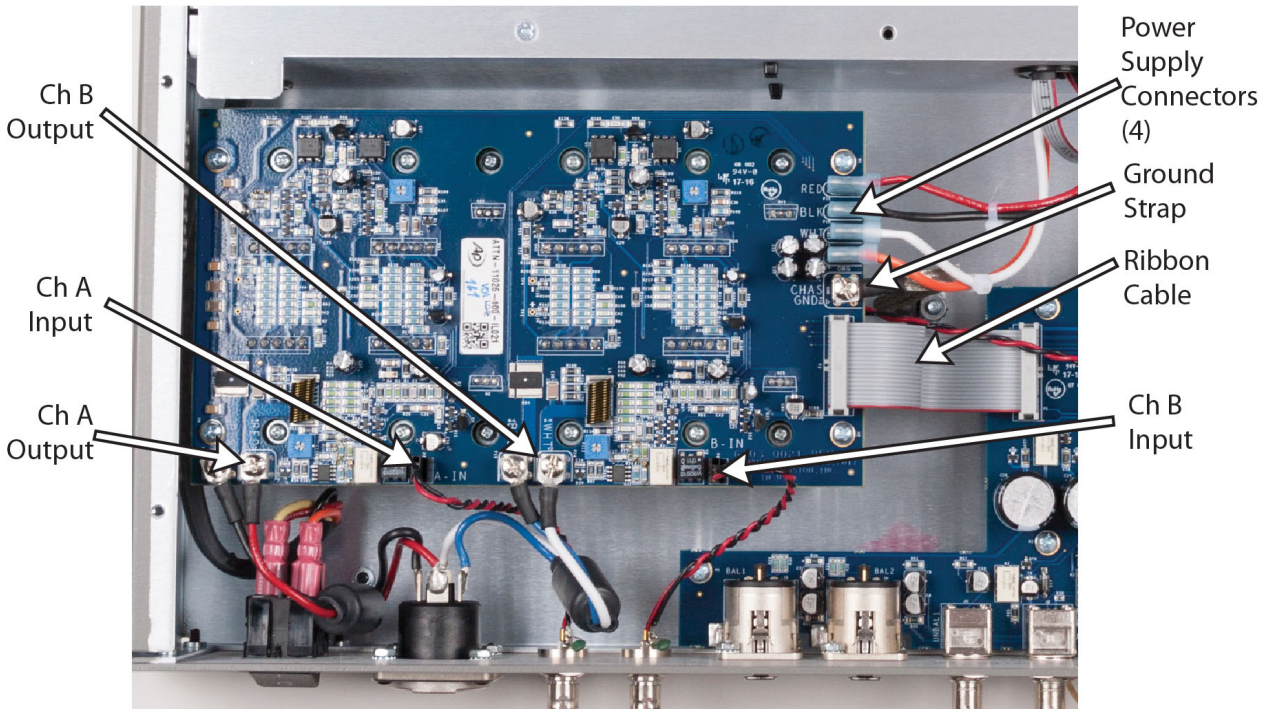


APx1701 with top panel removed.

9.7.2 Removing the Titan power amplifier module assembly (ATTN)

Refer to Component Locations as necessary, beginning on page 9-12.

4. Caution! The power amplifier must be removed as an assembly, removing the circuit board and heat sink together.
5. Using a set of blunt-nose pliers, disconnect all the power supply spade lug connectors plus the ground bonding strap at location P10 from the Titan power amplifier module assembly. Next, disconnect the amplifier output spade lug connectors located at P7 and P8. Later models used a screw terminal connector. For these, use a #2 Phillips screwdriver to disconnect the wires coming from the SpeakON output connector.
6. Disconnect the two red and black twisted cables from the front panel BNC input connectors at P5 and P6. Finally disconnect the flat ribbon control cable at P3 coming from the ASRN USB interface module.



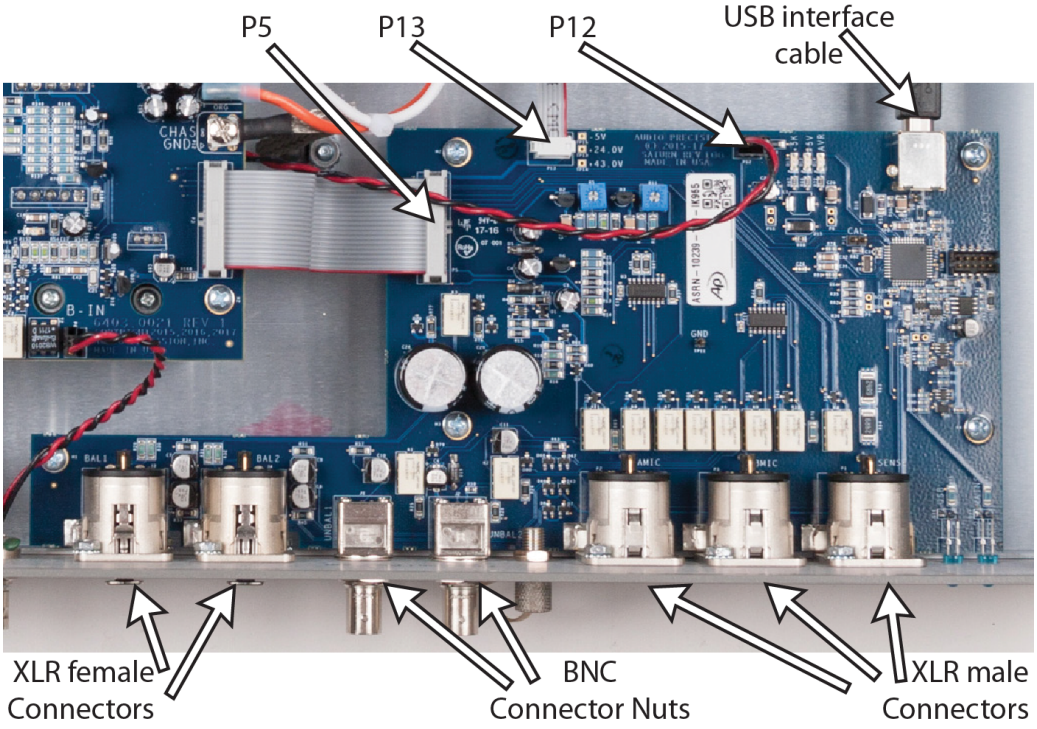
Titan board (rev 001).

7. Position the APx1701 in the upside-down position and remove the four Phillips screw fasteners, as indicated in the figure below.

APx1701 Titan mount screw locations, on bottom cover.

8. While holding the Titan power amplifier module assembly disconnect the red and the black wires from the thermal sensor on the bottom of the Titan heat sink. Carefully remove the power amplifier Titan module assembly and place it in a proper antistatic enclosure.

9.7.3 Removing the Saturn USB interface controller module (ASRN)



Saturn board.

9. Using your fingers, gently disconnect the USB interface cable at J6. Disconnect the twisted red and black wire cable with the two-pin connector at P12.
   Disconnect the six-pin flat ribbon connector at P13.
   Disconnect the twenty-pin ribbon connector at P5.
10. Using the 9/16" (15 mm) deep socket wrench to remove the two BNC connector panel nuts. Using the #0-0 (5/64") flathead screwdriver (Neutrik SD-1), unlock the XLR connector latch on the female and male XLR connectors by inserting the latch tool into the small hole

located just above the pin 1 and pin 2 connectors on the XLR connector face. This is done by rotating the latch tool counterclockwise.

11. Using a #2 Phillips screwdriver remove the five Phillips screw fasteners on the circuit board.
12. Carefully remove the ASRN interface module and place it in a proper antistatic enclosure.
13. To reinstall the ASRN module please follow the above instructions in reverse order.

9.7.4 Removing the ADNE +5 Vdc and +48 Vdc phantom power supply module

WARNING!—Deadly voltages present! Be sure the mains power cord is disconnected.

14. This module has two separate feeds to supply power to the two cooling fans. Remove both of these two pin connectors at P2 and P3. The power supply feed cable located at P1 is soldered in place, leave it connected to the ARHE board. Disconnect the other end of this cable from the ASRN board at P13 and carefully draw the ribbon cable back through the access hole in the central chassis support wall.
15. Using a #1 Phillips screwdriver remove the four Phillips fasteners.
16. Carefully remove the ADNE module and place it in a proper antistatic enclosure.
17. To reinstall the ADNE module please follow the above instructions in reverse order.

9.7.5 Removing the ARHE (mains line filter) module

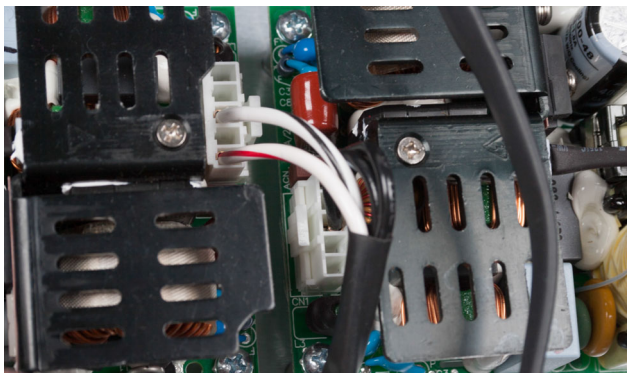
WARNING!—Deadly voltages present! Be sure the mains power cord is disconnected.

18. Disconnect the wiring from the chassis mount power entry module to the ARHE module. Remove the brown wire at P1 and the blue wire at P2 from the spade connectors.
19. Disconnect the mains power switch wiring to the spade connectors on the ARHE module. Remove the orange wire from P6. Remove the yellow wire from P5. Remove the red wire from P3. Remove the black wire from P4.
20. Disconnect the mains power feed from the ARHE module to the two switching dc power supplies. Remove the BLK/WHT wire from P8. Remove the BLK/RED wire from P7. Remove the WHT/BLK wire from P10. Remove the WHT/RED wire from P9.
21. Using a #2 Phillips screwdriver remove the four Phillips screw fasteners.
22. Carefully remove the ARHE module and place it in a proper antistatic enclosure.
23. To reinstall the ARHE module please follow the above instructions in reverse order.

9.7.6 Removing the switching power supplies

WARNING!—Deadly voltages present!

24. To disconnect the Molex brand cable connectors from the mains supply, gently pinch the connector release to remove the mains AC female cable connector from the switching power supply.



25. To disconnect 48 Vdc feeds to the Titan amplifier. Using a #2 Phillips screwdriver unscrew the lug terminal by one turn and dis-

connect the spade lug wires from the terminal connector.

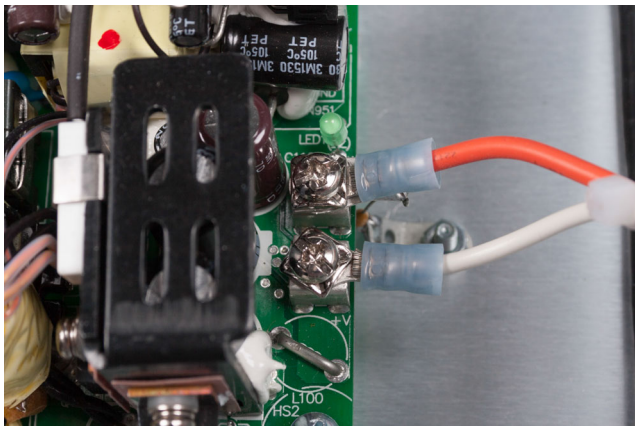
26. Using a #2 Phillips screwdriver remove the four Phillips screw fasteners.
27. Carefully remove the switching power supply module and place it in a proper antistatic enclosure.
28. To reinstall the switching power supply module, please follow the above instructions in reverse order.

9.8 Repair/Adjustment start-up checks

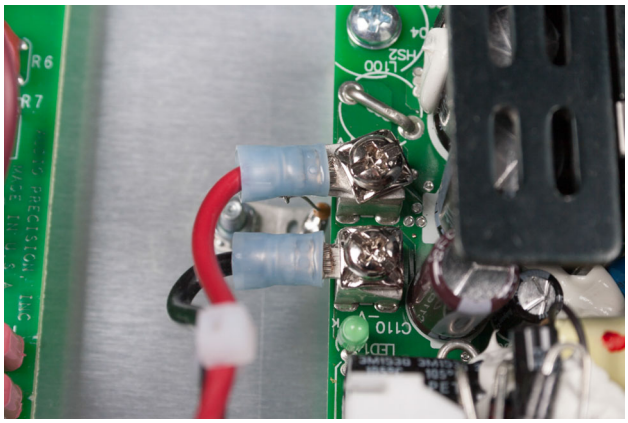
9.8.1 Power Supply Checks

WARNING!—Deadly voltages present! Do not touch the MEAN WELL heat sinks or other uninsulated components.

29. Check for proper dc power supply voltage at the following locations before proceeding to adjustments or Self Tests.
30. Measure the +48 V dc MEAN WELL switching supply (on the right side of the chassis). The orange wire is chassis ground; the white wire should measure +48.5 V dc.



31. Measure the –48 V dc MEAN WELL switching supply (on the right side of the chassis). The red wire is chassis ground; the black wire should measure –48.5 V dc.



32. On the Saturn (ASRN) module check the +24.0 Vdc ±0.05v at the test point TP13 near P13. Adjust R11 if the reading is not correct.
33. Check the +43.0 Vdc ±0.05 at the test point TP14. Adjust R5 if the reading is not correct.
34. Check the –5.0 Vdc ±0.05 at the test point TP15.
35. Check test point TP10 for +3.3 Vdc.
36. Check P6 pin 1 for +4.9 Vdc.
37. Check P10 pin 1 for +4.9 Vdc.

9.8.2 Adjustments

Tools Needed:

- Agilent 34401 DMM or equivalent.
- Small insulated adjustment screwdriver.
- CAB-1701 cable set.
- SLFT-KIT-1701. This kit contains the SLFT-1701 Self Test Fixture, one SpeakON to SpeakON cable, two BNC to BNC cables, and four XLR female to XLR male cables. A ground strap is also required.
- APx515, 52x or 555 Audio Analyzer.

9.8.3 Adjustment

See page 4-1 in the Adjustments Section for general info.

See page 9-17 in this section for adjustment and test point locations.

The adjustment projects are found on the software disc. Open APxAdjust.exe with the USB cable connected and the power applied.

Open the APx1701 adjustment project and follow the prompts.

9.8.4 Self Tests

The Self Test app and projects are located in the Service \ SelfTest folder on the APx Service Package disc.

The SelfTest.exe application will first run through the test projects for the APx analyzer, then it will run a separate project for the APx1701.

9.9 Mechanical Diagram

Table 9-1: Chassis

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
26	ATTN.ASSY	ASSY, TITAN W/HEATSINK, APx1701	1
25	ARHE.0000	PCB ASSEMBLY, RHEA	1
24	AFPN.1701	ASSEMBLY, FRONT PANEL W/SATURN, APx1701	1
23	AFAN.0ATA	FAN ASSY, APx1701	2
22	ADNE.0000	PCB ASSEMBLY, DIONE	1
21	7330.0015	FINGER GUARD, 60mm	2
20	7321.0013	GASKET SET, 60mm FAN	2
19	7310.0055	PARTITION, CHASSIS, FINISHED, APx1701	1
18	7160.0041	SHIELD, SAFETY, ELECTRICAL, FINISHED, APx1701	1
17	7150.0225	COVER, TOP, FINISHED, APx1701	1
16	7150.0150	CHASSIS, SHEET METAL, FINISHED, APx1701	1
15	5630.0011	FEET BLACK .8" ROUND	4
14	5224.0001	NUT, KEP, #8-32	1
13	5223.0001	NUT, KEP, #6-32	9
12	5222.0001	NUT, KEP, #4-40	2
11	5113.7116.2	SCREW, MC, SEM, PH, ZN, BLK, #6-32 X .38 LG	4
10	5113.7112	SCREW, MC, SEM, PH, ZN, #6-32 X .38 LG	17
9	5113.1112.2	SCREW MC FLT PH 6-32X3/8 BLK OX M/S	36
8	5113.1108.8	SCREW, FLT, PH, 100 DEG, ZN, #6-32 X .25 LG	2
7	5112.3144	SCREW, MC, PAN, PH, ZN, #4-40 X 1.38 LG	8
6	5112.3112	SCREW, MC, PAN, PH, ZN, #4-40 X .38 LG	4
5	5112.3108	SCREW, MC, PAN, PH, ZN, #4-40 X .25 LG	4
4	4540.0300	PWR INVERT MEANWELL EPP-300-48 48v	2
3	4540.0009	MODULE, POWER ENTRY, APx1701, W/HW	1
2	4255.0002	JACK BANANA GNDED KNURLED	1
1	4112.0012	CABLE, USB 2.0, 12", TRIPPLITE	1
BILL OF MATERIAL			

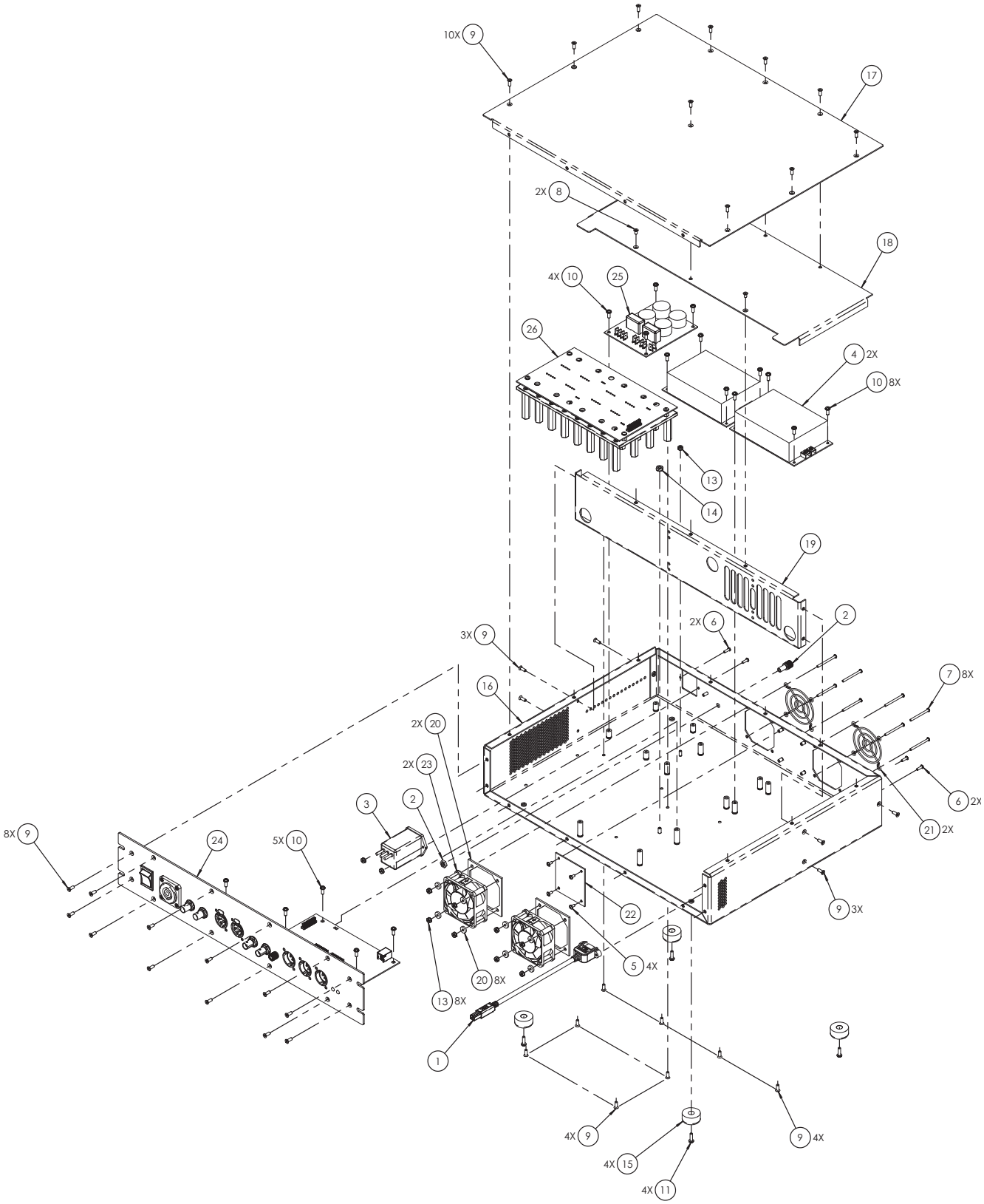


Figure 9-1 APx1701 Chassis

9.10 Component Locations

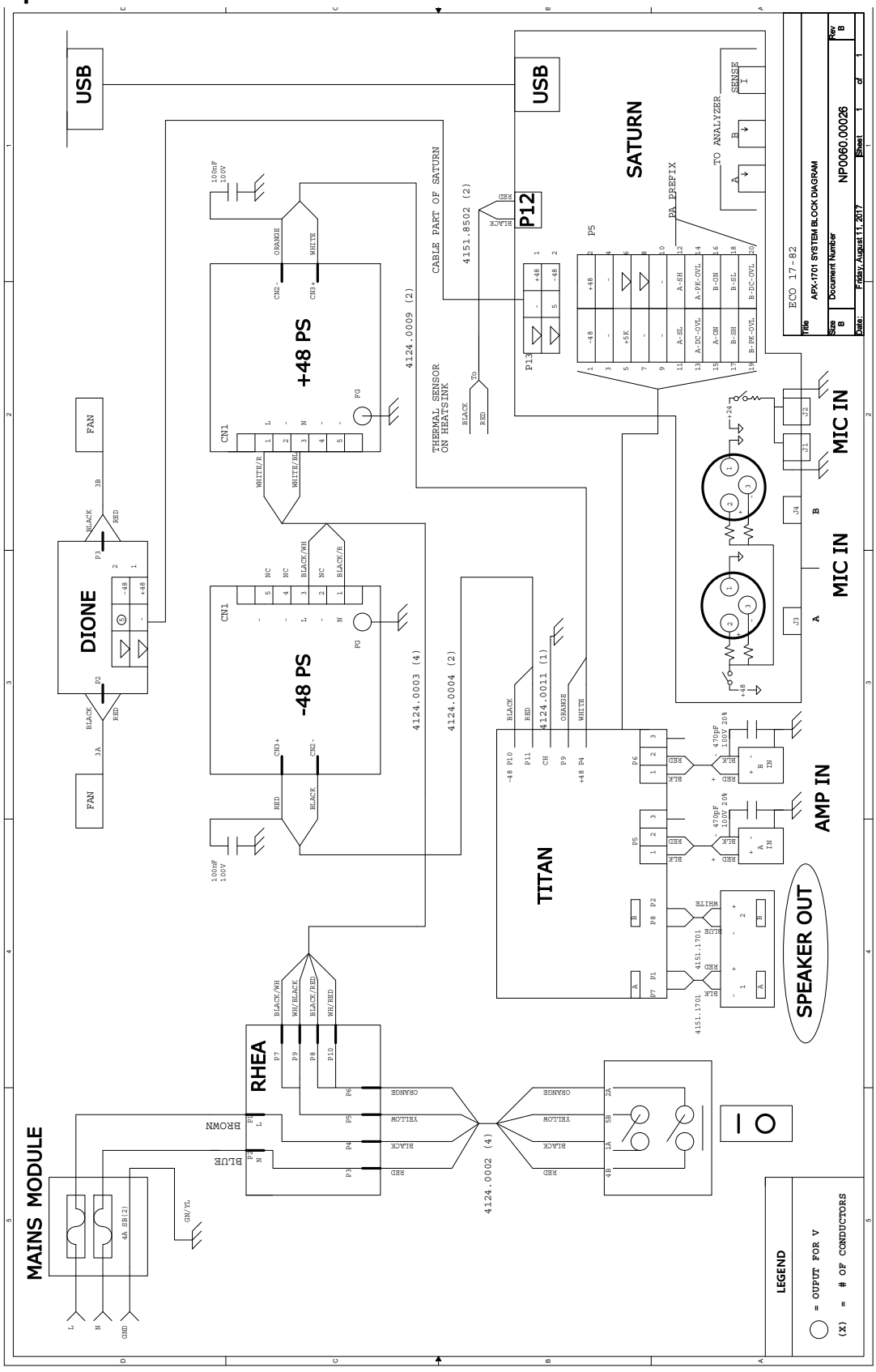


Figure 9-2 APx1701 System Diagram

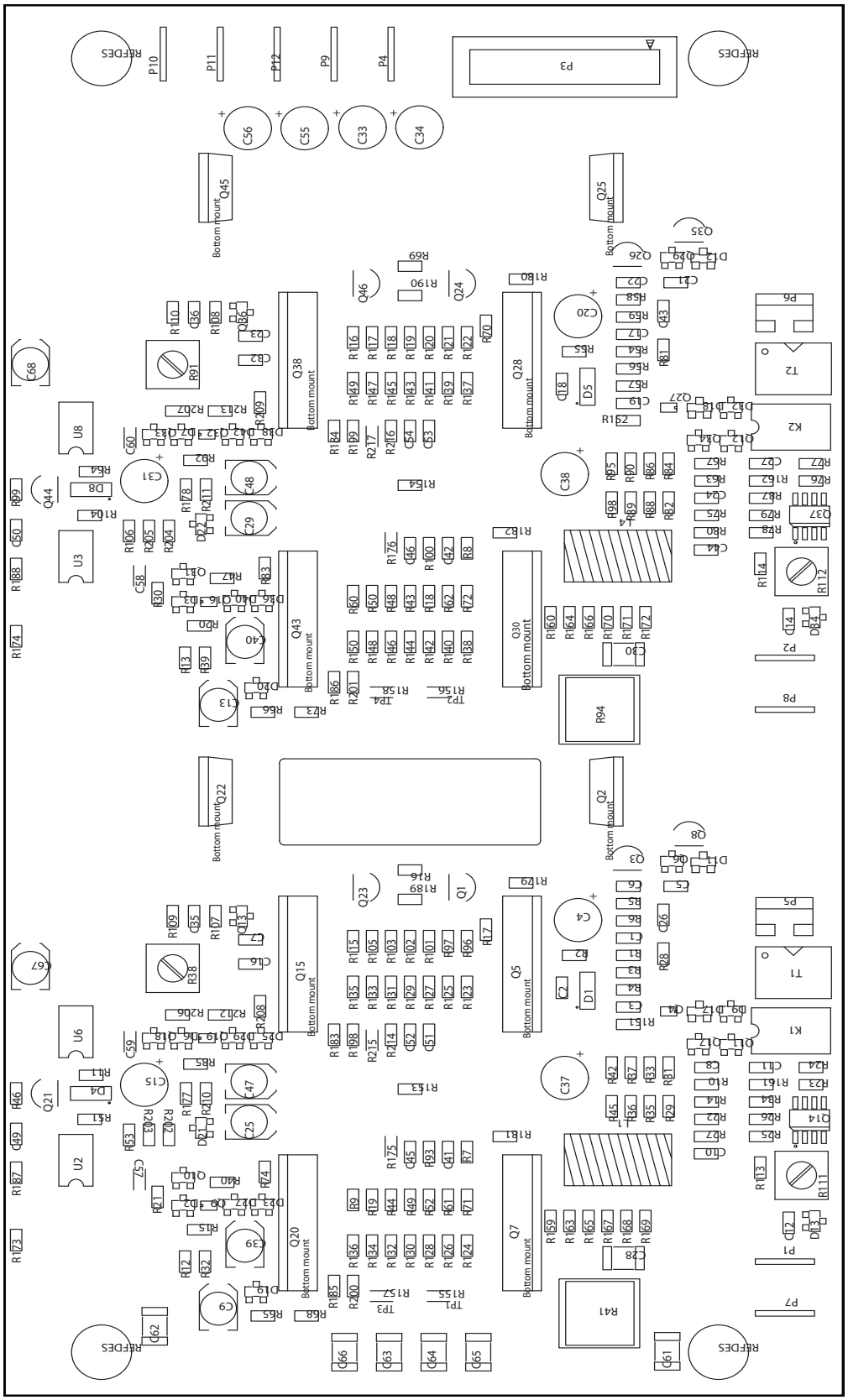


Figure 9-3 APx1701 Titan (ATTN) power amplifier circuit board rev 0

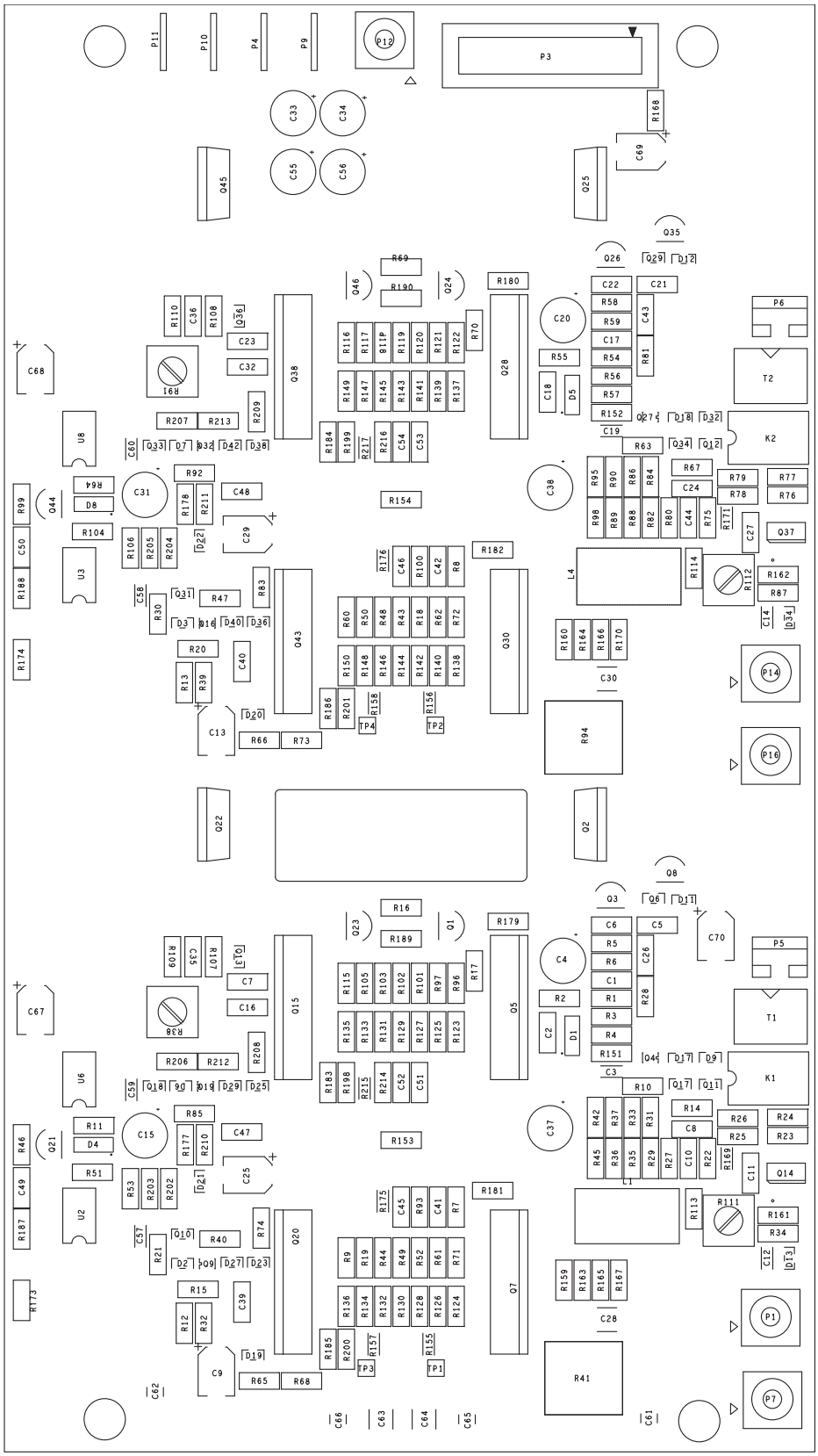


Figure 9-4 APx1701 Titan (ATTN) power amplifier circuit board rev 1

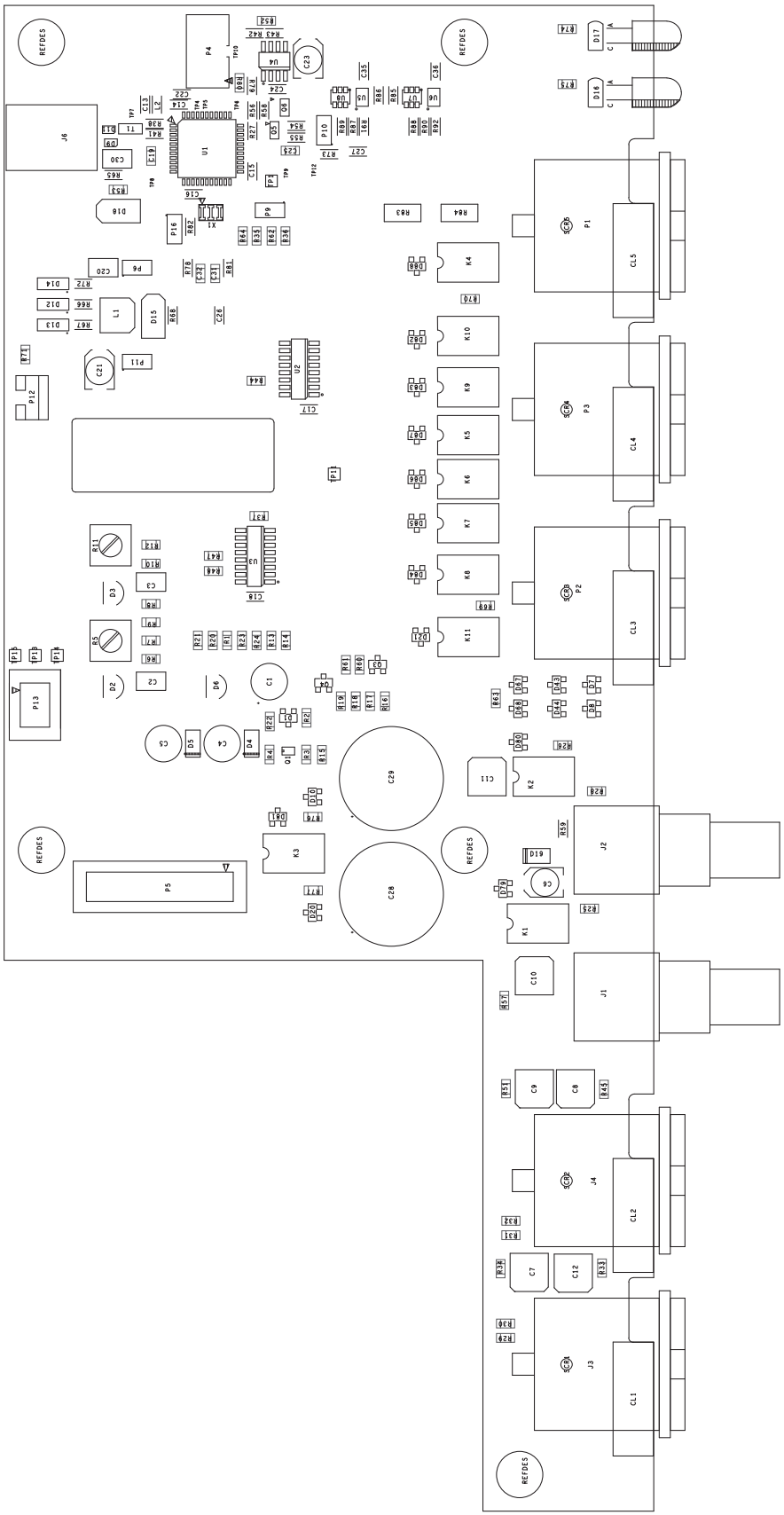


Figure 9-5 APx1701 Saturn (ASRN) Rev 1 circuit board

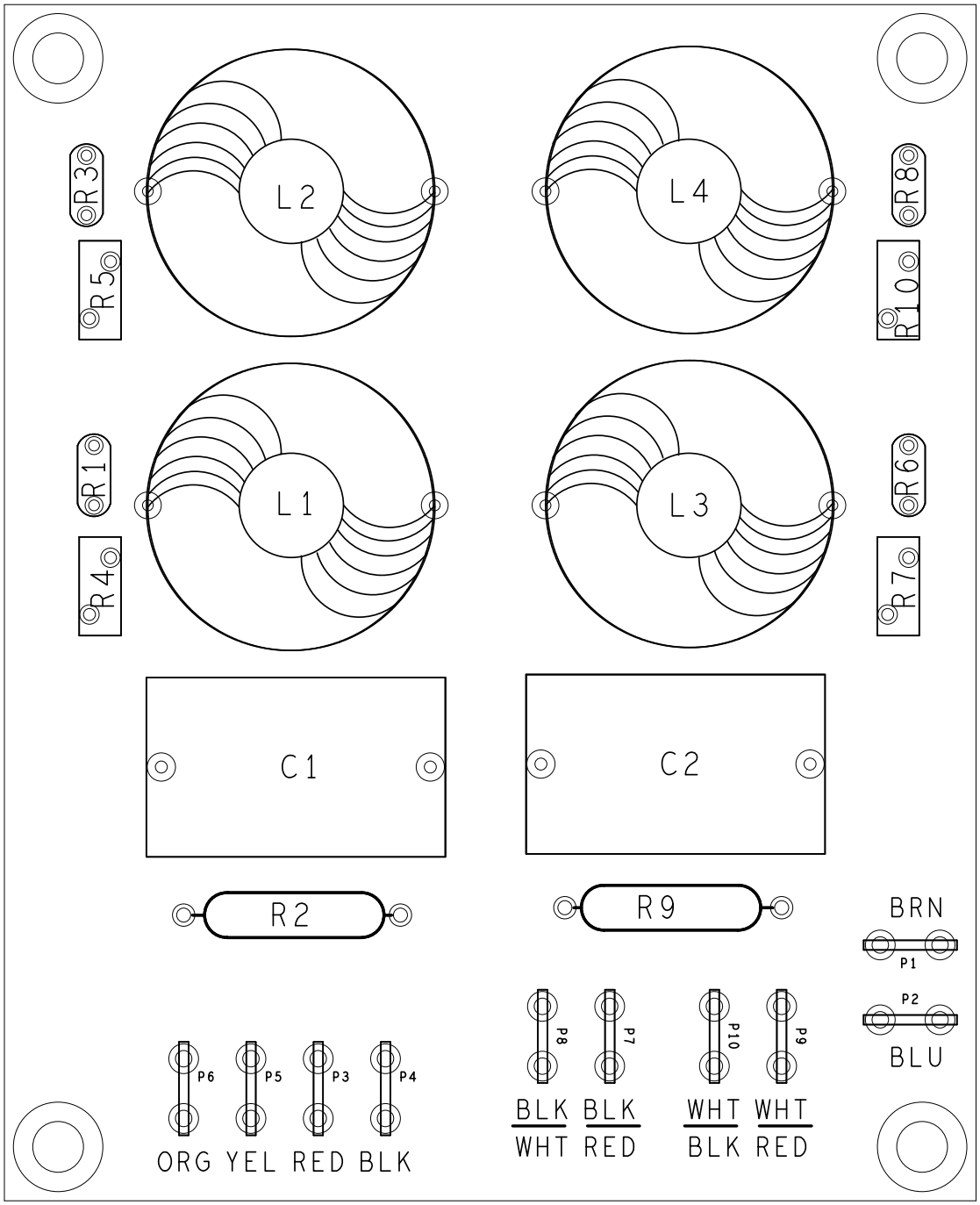


Figure 9-6 APx1701 Rhea (ARHE) mains line filter circuit board

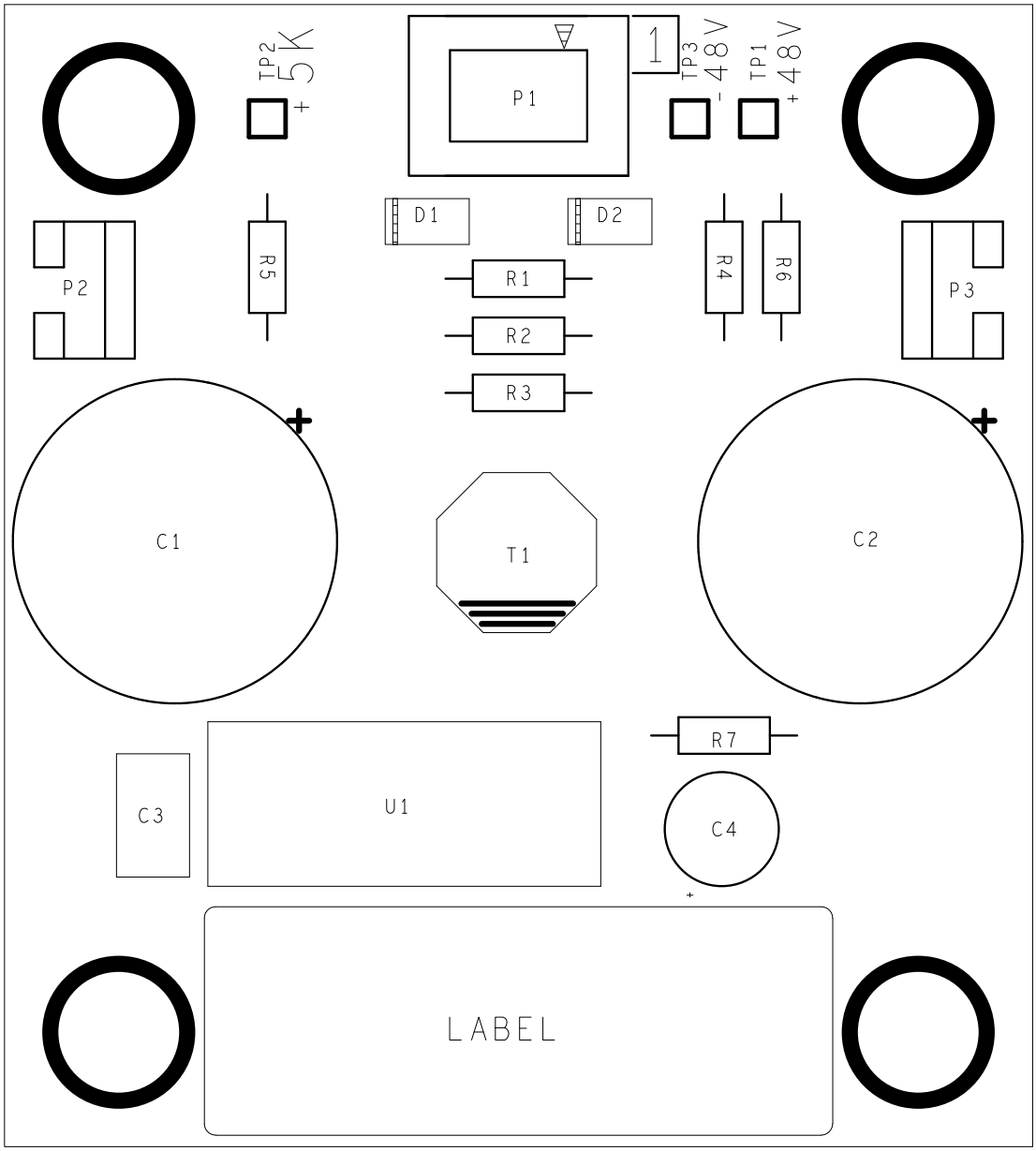


Figure 9-7 APx1701 Dionne (ADNE) +5 and +48 phantom power circuit board

9.11 Adjustment Diagrams

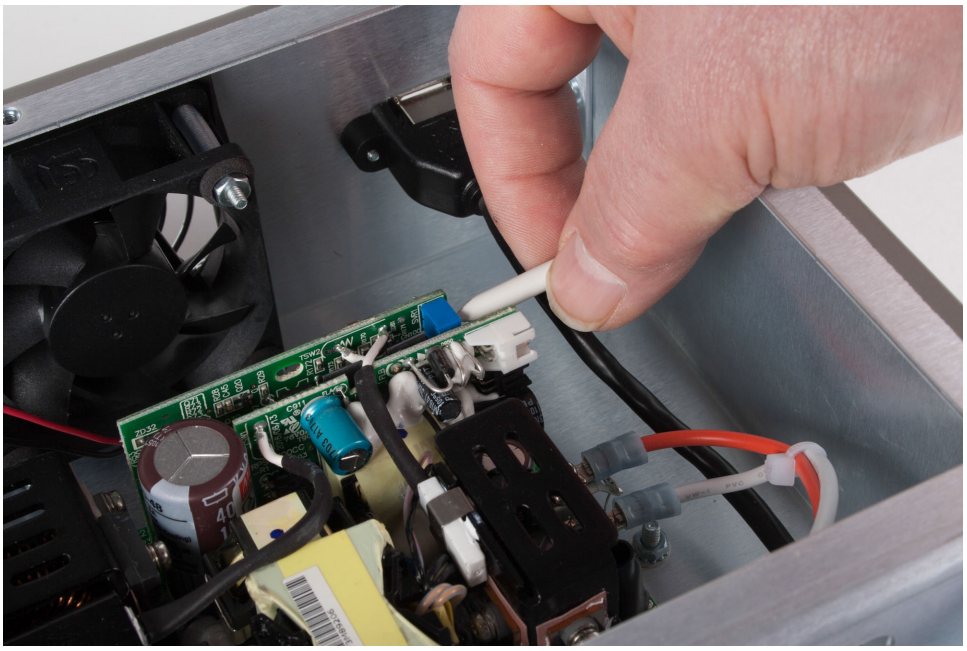


Figure 9-8 APx1701 Mean Well +48 V dc Power Supply adjustments

WARNING!—Deadly voltages present!
Do not touch the MEAN WELL heat sinks or other uninsulated components.
.

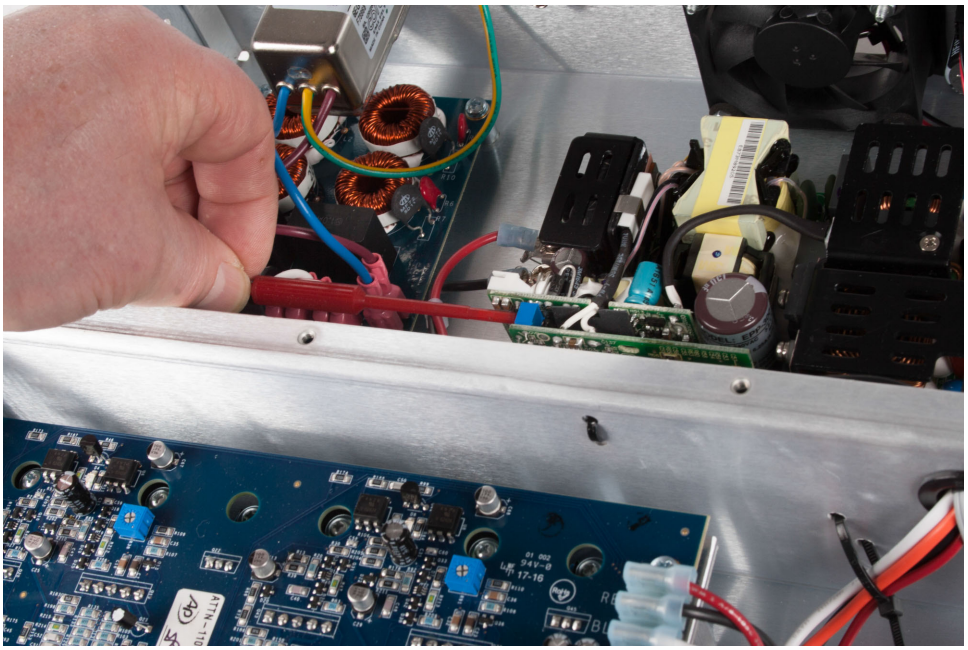


Figure 9-9 APx1701 Mean Well –48 V dc Power Supply adjustments.

WARNING!—Deadly voltages present!
Do not touch the MEAN WELL heat sinks or other uninsulated components.

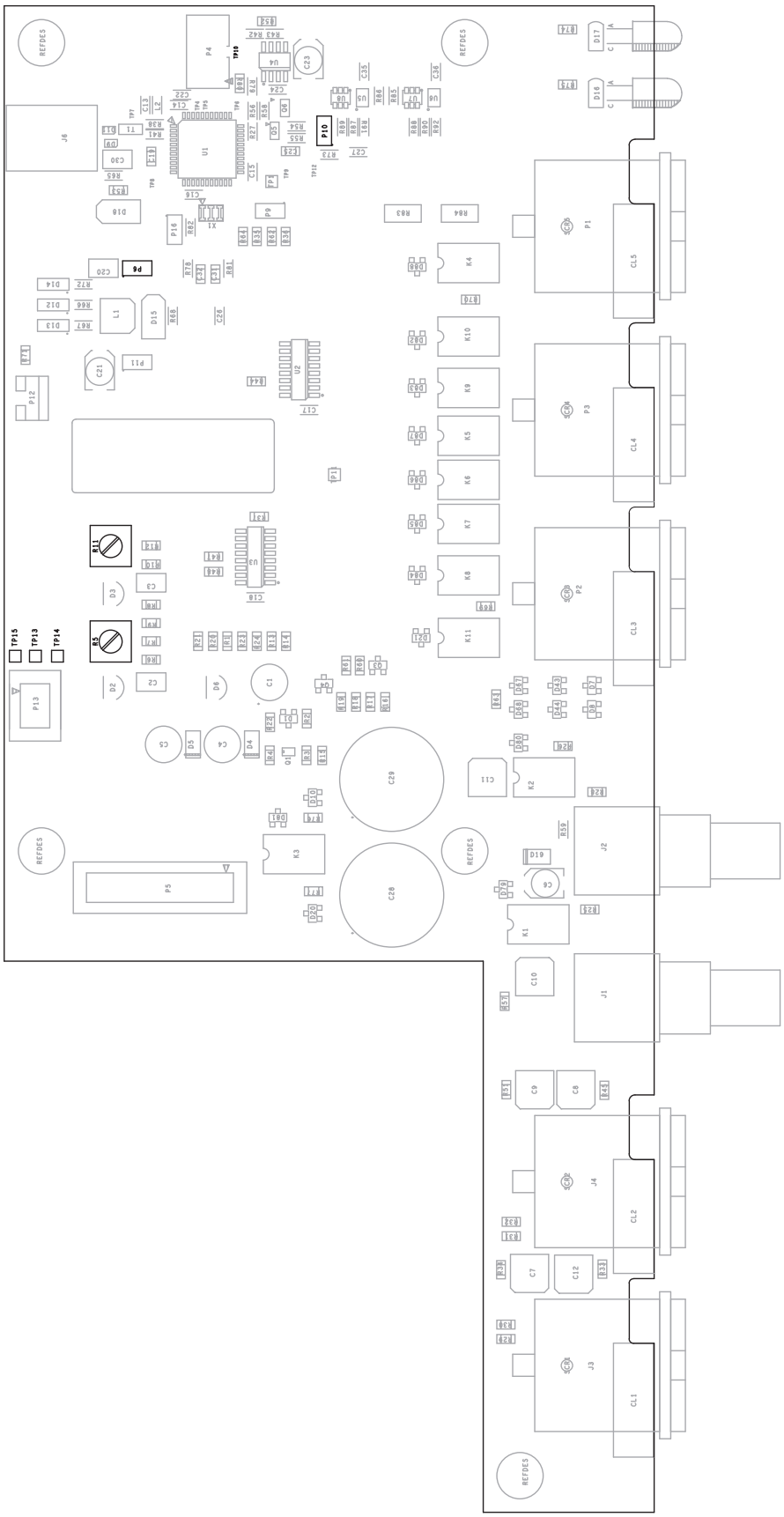


Figure 9-10 APx1701 Saturn Board Adjustment Locations

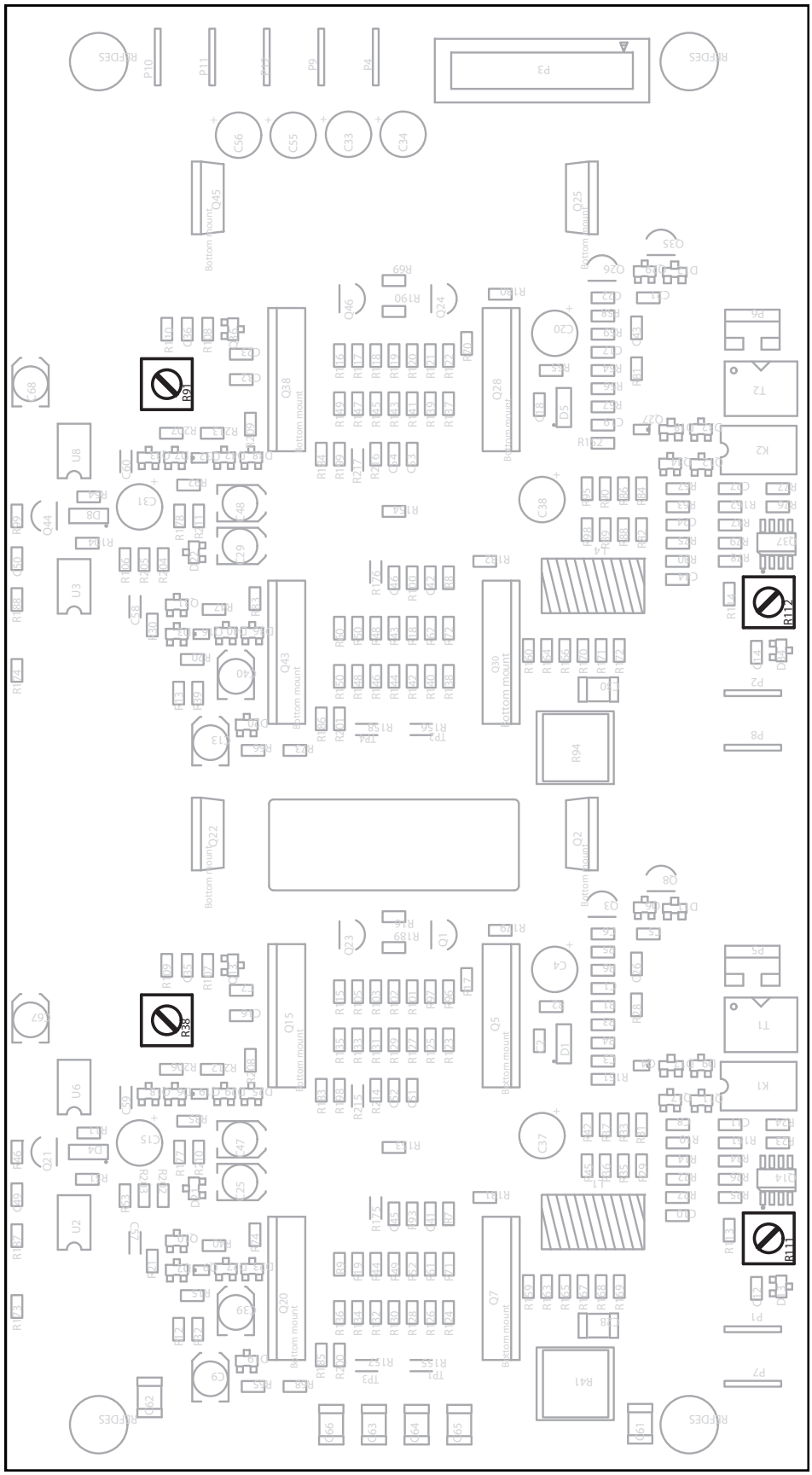


Figure 9-11 APx1701 Titan board rev 0 Adjustment Locations

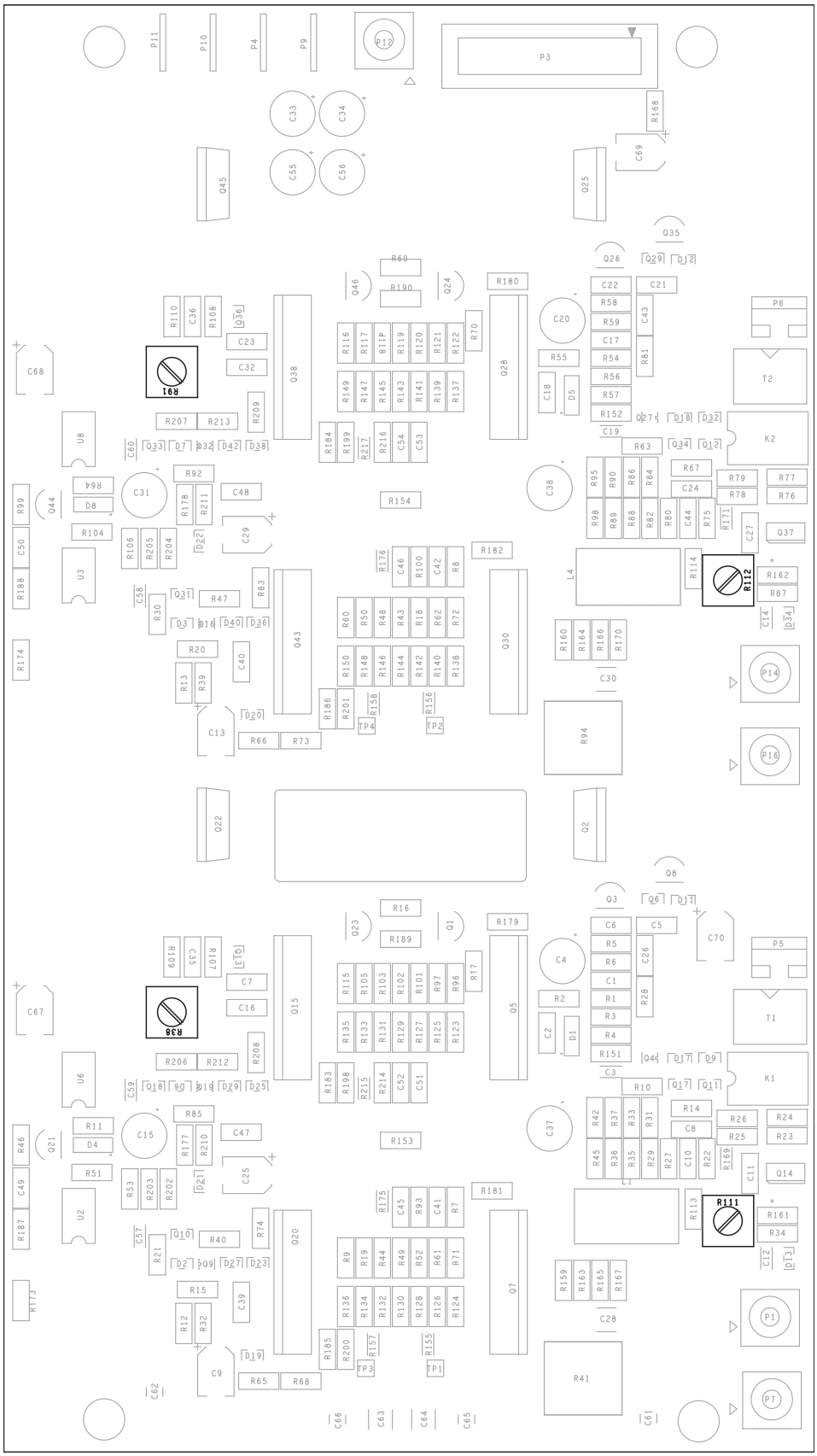


Figure 9-12 APx1701 Titan board rev 1

Section 10: Service Advisory Bulletins

10.1 Introduction

Periodically, Audio Precision issues Service Advisory Bulletins when specific issues are found with APx500 Series instruments. Each Service Advisory Bulletin addresses a specific issue and gives the recommended resolution. When you receive a Service Advisory Bulletin, we suggest that you add it to this section of the service manual.

5750 SW Arctic Drive
Beaverton, Oregon 97005
Tel: 503-627-0832
Fax: 503-641-8906
US Toll Free: 1-800-231-7350

Date: August 2006

Service Advisory Bulletin: AP5-0001

To: All Audio Precision Distributors

From: Jim Duncan Service Manager

Subject: The APX-585 instrument Digital Input-Output Module Status indicators may fail due mechanical separation of the plastic light pipe from the LED component. This Service Bulleting covers APX-585 instruments with the rear panel serial numbers of AP5-10525 thorough AP5-10538.

Precautions:

Proper ESD procedures should be followed to prevent ESD damage to the Digital Input-Output Module and APX-585 instrument.

Required Parts

1. RTV Silicone Glue or any Silicone glue not harmful to electronics.
2. A quantity of two “Sealed AP” tampers labels.

Directions:

1. Disconnect the AC Mains cord from the instrument.
2. Place the instrument in an ESD safe working area.
3. Turn the APX-585 instrument over so the bottom panel is up. See Figure One
4. Remove the screws that secure the Bottom cover of the APX-585 instrument.
5. Locate and remove the Digital Input-Output Module. The module will have a serial label with the lettering “BCIF”. See Figure Two.
6. Remove the four Front Panel attachment screws that secure the Digital Input-Output Module. Disconnect the flat ribbon cable connector that attaches to the companion module and remove the Digital Input-Output module form the instrument.
7. Remove the screws that attach the two support straps to the Digital Input-Output module. Remove the straps. See Figure Two.
8. Apply a small amount of RTV Silicone glue to each of the four plastic light pipe assemblies on the Digital Input-Output Module as shown in Figure Three.

9. Reassemble the two support straps to the Digital Input-Output Module using the original mounting hardware.
10. Reinstall the Digital Input-Output Module into the APX-585 instrument using the original Front Panel attachment screws, and reconnect the flat ribbon cable connector to the companion module.
11. Power on the instrument and check for proper operation of the instrument using the APX-585 Performance Check procedure. During the APX-585 Performance Check Procedure of the Digital Input-Output module, visually check the Status Indicators for correct operation.
12. Re-install the instrument Bottom cover using the previously removed hardware.
13. Apply the “Sealed AP” tampers label as show in Figure One.

Figure One
Bottom of the APX-585 instrument

Figure Two
APX-585 instrument Digital Input-Output Module (BCIF)

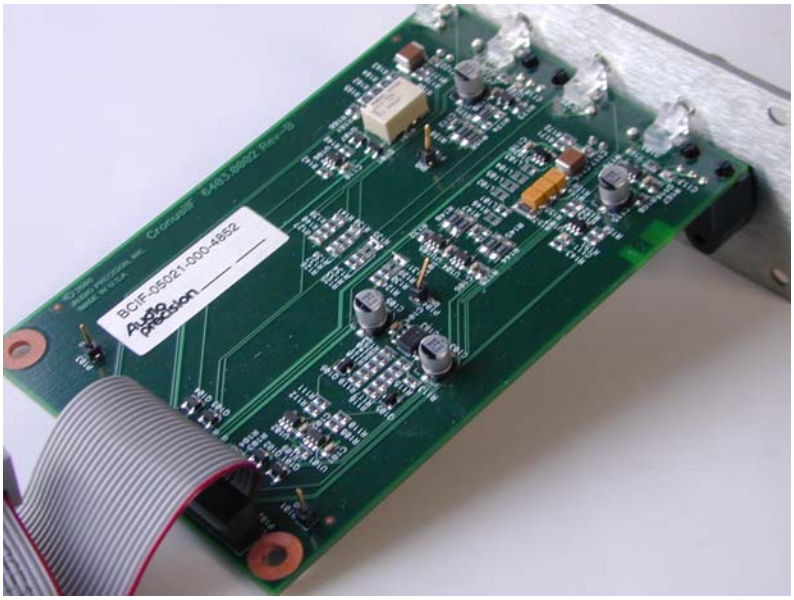


Figure Three
APX-585 instrument Digital Input-Output Module (BCIF) with Silicone glue applied

End of Service Bulletin

Service Advisory Bulletin AP5.0002
APX-585 series instruments

Date: February 2007

To: All Audio Precision Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Replacement of Analog Output Module (BPLX) to eliminate possible functional defect.

Summary

Audio Precision has recently identified a minor defect in the APX-585 instrument that may cause the Analog Unbalanced Outputs to malfunction when driving a device under test with floating input connections at output voltage levels above 1 Volt RMS. During this failure mode the APX-585 instrument Analog Unbalanced Output signal will not produce the correct output voltage and the distortion of the signal may be out of specification. To eliminate the function failure, a new Analog Output Module (BPLX) will need to be installed in place of the existing module.

This service advisory covers the modifications for the Audio Precision models:

- APX-585 with instrument Serial Numbers between10526 to 10557

Please be sure that this service advisory is applicable to your instrument before proceeding.

Tools and Required Materials

- #2 Philips screw driver.
- Needle-nosed pliers or tweezers.
- Static-protection wrist strap or other grounding device.
- IC Puller Tool

Caution

For the hardware removal and installation procedures:

Perform all tasks in an ESD-protected (ElectroStatic Discharge-protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20–1999.

Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

Parts Required

APX-585 Analog Output Module (AP part number BPLX.0000)

Proper method for identifying an APX-585 Analog Output Module that may need replacement

1. Apply AC Mains voltage to the instrument and power the instrument to the on condition.
2. Launch the APx-500 Operating software.
3. On the APx-500 Operating Software select Help and About.
4. On the “About APx500” Panel (see Figure 1) select the “8-Channel Analog Output Module”.
5. On the “About APx500” Panel “Component Details” the first line of information will display the Analog Module Identification, Module Serial Number, and Revision Level.

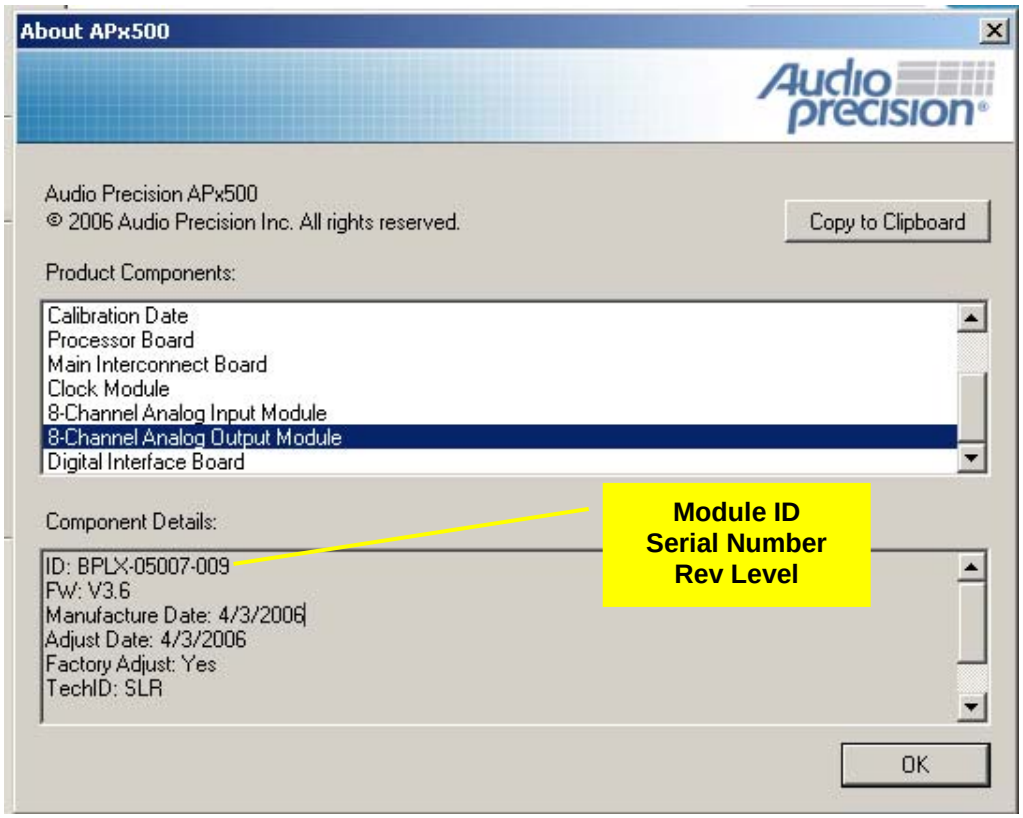


Figure 1

Help About Menu Panel

6. The last three numbers of the Module Identification Numbers indicate the Revision Level of the Analog Output Module.
7. If the Analog Output Module Revision Level is 103 or greater, the APX-585 has the correct modifications and no action is necessary to the APX-585 instrument.
8. If the Analog Output Module Revision Level is 009, 100, 101, & 102, then contact Jim Duncan (jimd@ap.com) of Audio Precision about obtaining a replacement module (AP part number BPLX.0000). The replacement Analog Output Module will have a revision level of 103 or greater.
9. After receiving the replacement Analog Output Module follow the Modification Procedure instructions.

Modification Procedure

Disassembling the instrument

10. Disconnect the ac mains power cord from the instrument.
11. Place the instrument in an ESD-safe working area.
12. Remove the APX-585 instrument cover to gain access to the Analog Output or BLPX module. Save all the screws that secure the cover to the APX-585 instrument.
13. When viewed from the front of the APX-585 instrument, the BLPX module is located on the left side, and will have a label with the starting information of "BLPX" (See Figure 1).

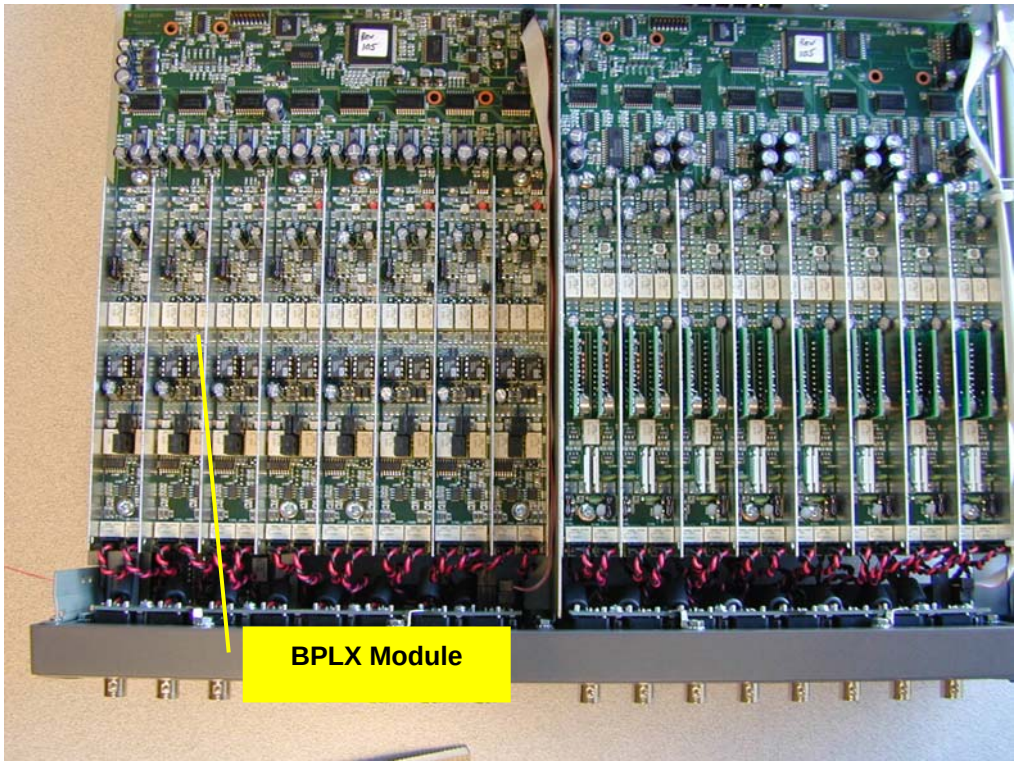


Figure 1 APX-585 instrument with top cover removed

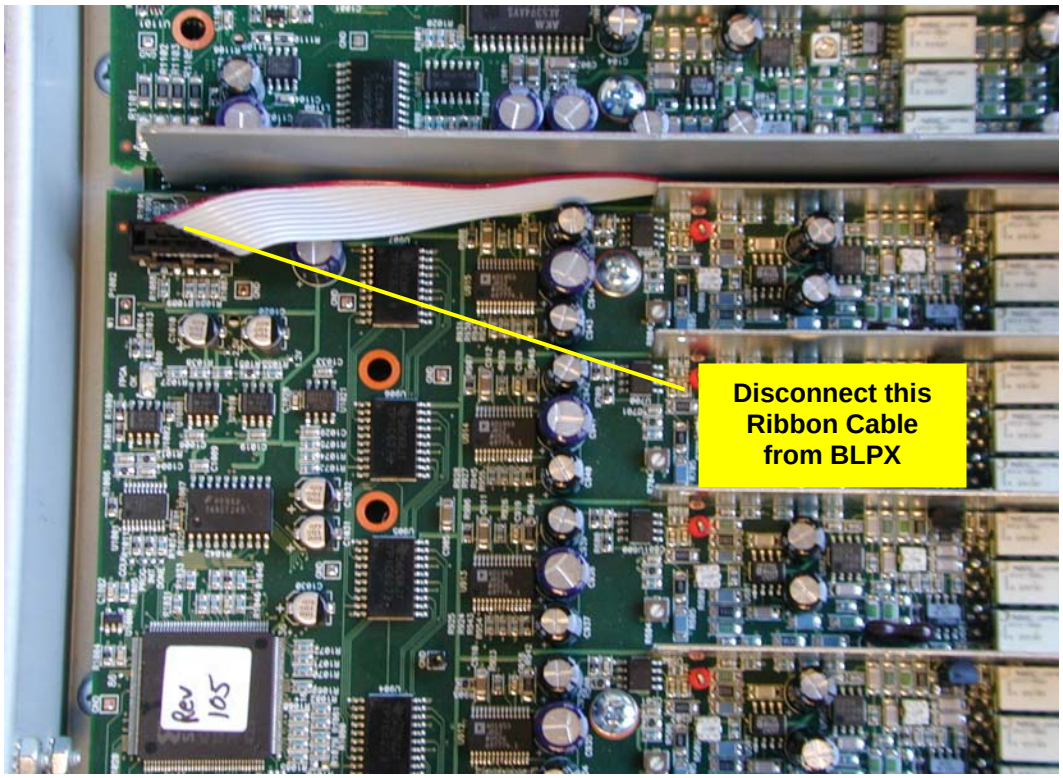


Figure 2 BLPX module and Ribbon Cable Connector

14. All interconnect cables must be disconnected before removing the BPLX module. Start by disconnecting the Ribbon Cable Connector shown in Figure 2. The Ribbon Cable just needs to be moved aside to allow removal of the BPLX module.

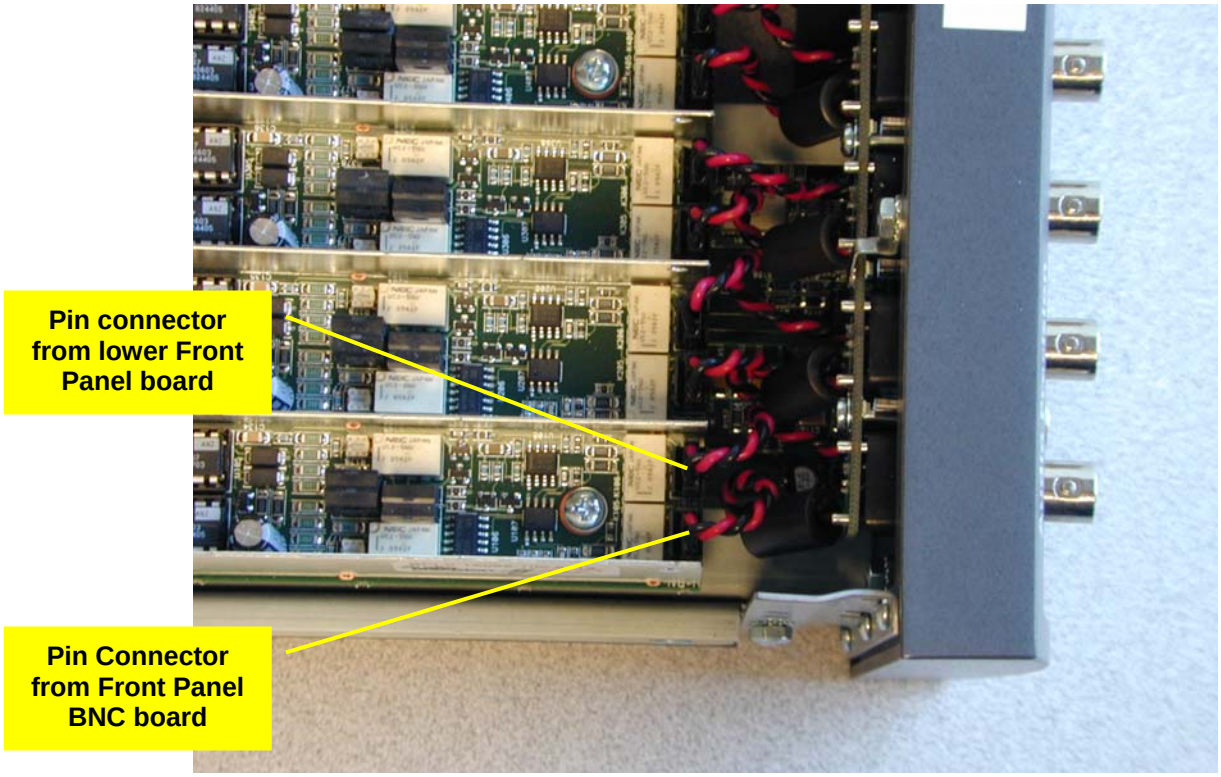


Figure 3 BPLX Module Analog Connections to the Front Panel Module

15. Next disconnect the 16 connectors with the twisted red and black wires from the BPLX module. Note the red and black wires attached to the BNC Front Panel circuit board have Ferrite beads. The Pin connectors are polarized to prevent improper connection.

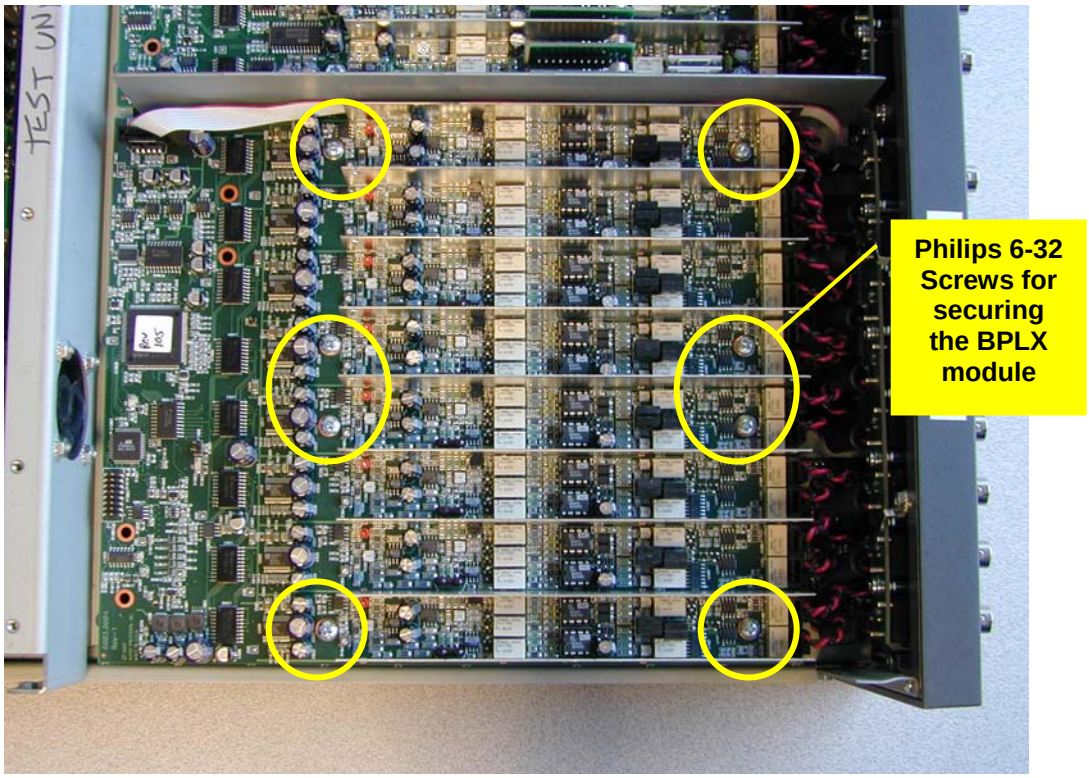


Figure 4 APX585 BPLX Module

16. Use a Philips # 2 Screw driver to remove the eight 6-32 Philips screws that secure the BPLX module to the APX-585 main chassis plate. Save the 6-32 Philips screws for re-installation of the new BPLX module. The 8 Philips screw locations are shown in Figure 4.

Figure 5 Integrated Circuit (IC) Puller Tool

17. When all the 6-32 screws are removed, the BPLX module is ready to be removed. The BPLX module is attached to the BRIO module by two interconnect sockets located on the underside of the BPLX module. NOTE: Do not use a screwdriver or other tools to pry the BPLX module up to disconnect the BPLX module from the BRIO module. The proper tool to lift up the BPLX module is an IC Puller tool (shown in Figure 5). Insert the IC Puller tool into the holes on the BPLX module indicated in Figure 6 and then gently lift up.
18. Once the BPLX module is removed completely from the APX-585 chassis, set it aside.

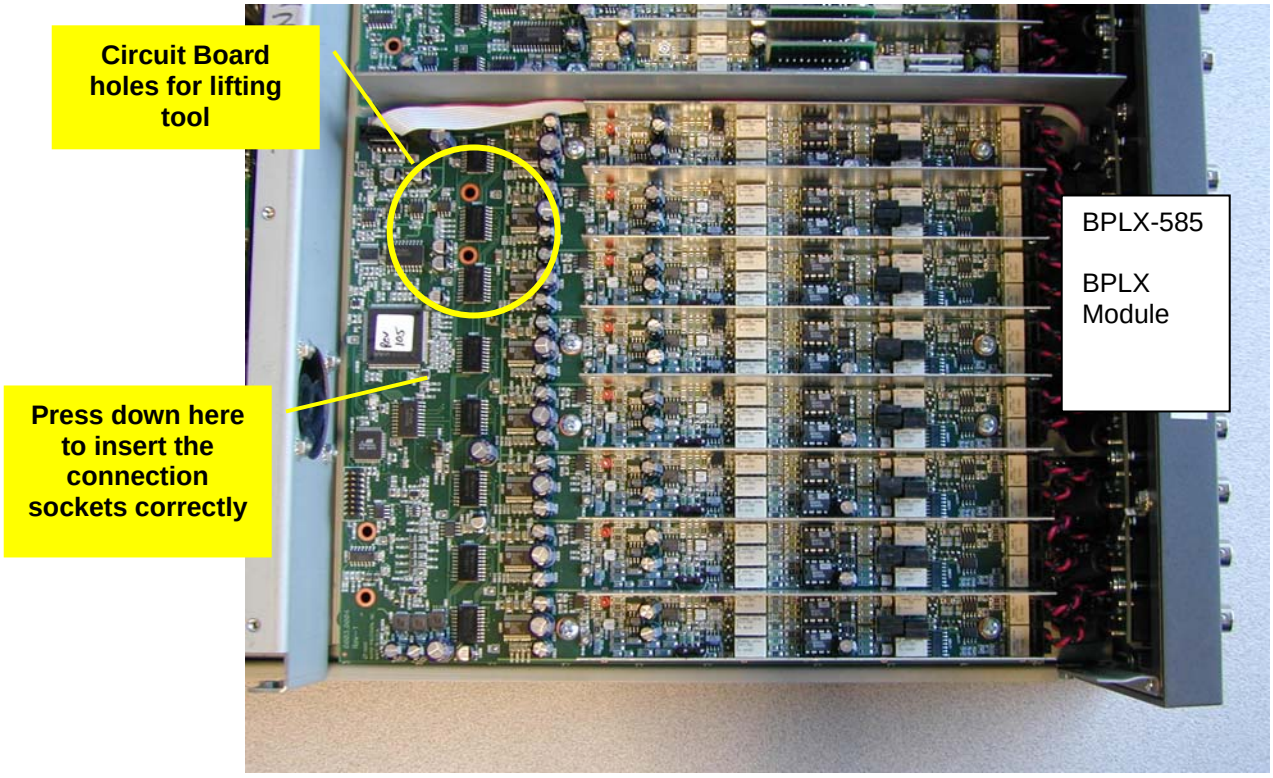


Figure 6 Removing the BPLX module form the APX-585 Chassis plate.

Installing the New BPLX module

19. Remove the replacement BPLX module from the antistatic bag and place the module onto the APX-585 Chassis Plate. Align the screw mounting holes in the BPLX module over the mounting standoffs. When the module is aligned correctly the threaded standoff holes will be visible through the screw mounting holes. Press down firmly on the BPLX module on the place noted in Figure 6.
20. Check that the BPLX module connection sockets are firmly attached to the BRIO module by gently lifting the edges of the BPLX module. When the BPLX module is correctly attached the edges of the module circuit board can not be lifted.
21. Install the eight 6-32 screws that secure the BPLX module to the Chassis Plate. See Figure 4 for the location of where to mount the previously removed 6-32 screws.
22. Re-attach the 16 Analog cable connectors from the APX-585 Front Panel to the BPLX module. See Figure 3 for placement of BNC connectors and other Front Panel connectors. Be sure to place the twisted Red and Black cables in the same position as shown in Figure 3.
23. Insert the Ribbon Cable connector on the BPLX module (See Figure 2). The ribbon cable should be placed as shown in Figure 1.
24. The APX-585 is now ready to check for proper operation. Connect the AC mains cable and press the power switch to the “on” position.
25. Connect the USB cable and launch the APX500 Software. Open the Performance Check Project and start the Performance Check project. No adjustments are necessary to the new BPLX module.
26. If the APX-585 Performance Checks fail, contact Jim Duncan at Audio Precision (jimd@ap.com).
27. If all the Performance Check tests pass, install the top cover of the APX-585 instrument with the screws previously removed.

This completes the modifications for the AP5-0002 Service Advisory Bulletin

Testing for Optimal Results

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audioprecision.com

21607jd

Service Advisory Bulletin APX-581
Pre-analyzer or Switch Model Filter

Date: May 2007

To: All Audio Precision Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Modifications to the APX-581 Pre-analyzer or Switch Mode Filter to block DC voltage from passing through the filters.

Summary

Audio Precision has recently identified a difficulty with the APX-585 instrument Analog Analyzer when measuring AC signals with a DC component from a Class D or Switch Mode Amplifier. The ground referenced DC voltages from the Class D or Switch Mode amplifiers may cause the APX-585 Analog Analyzer Input Range to be incorrectly set, causing incorrect signal levels and THD measurements. Modifying the APX-581 Filters to block DC voltages from amplifiers under test eliminates the possibility of APX-585 measurement errors.

This service advisory covers the modifications for the Audio Precision models:

- APX-581 with serial numbers from APX1-01500 to APX1-01520

Tools and Required Materials

- #1 & 2 Philips screw driver.
- Needle-nosed pliers or tweezers.
- Static-protection wrist strap or other grounding device.
- Soldering tools: appropriate soldering iron, solder and flux remover solvent

Caution

For the hardware removal and installation procedures:

Perform all tasks in an ESD-protected (ElectroStatic Discharge-protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20–1999.

Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

Parts Required

- 8 sets of matched pairs of 1.0 MFD capacitors AP p/n 2694.0105
- 16 inches of plastic tube AP p/n 5610.0100

Modification Procedure

Disassembling the instrument

1. Disconnect all external cables from the APX-581.
2. Place the APX-581 in an ESD-safe working area.
3. Remove the APX-581 top and bottom covers. Save the screws for securing the cover after the modifications are complete.
4. Please refer to Figure 1 for identification of the Filter Modules and disconnection of cables.

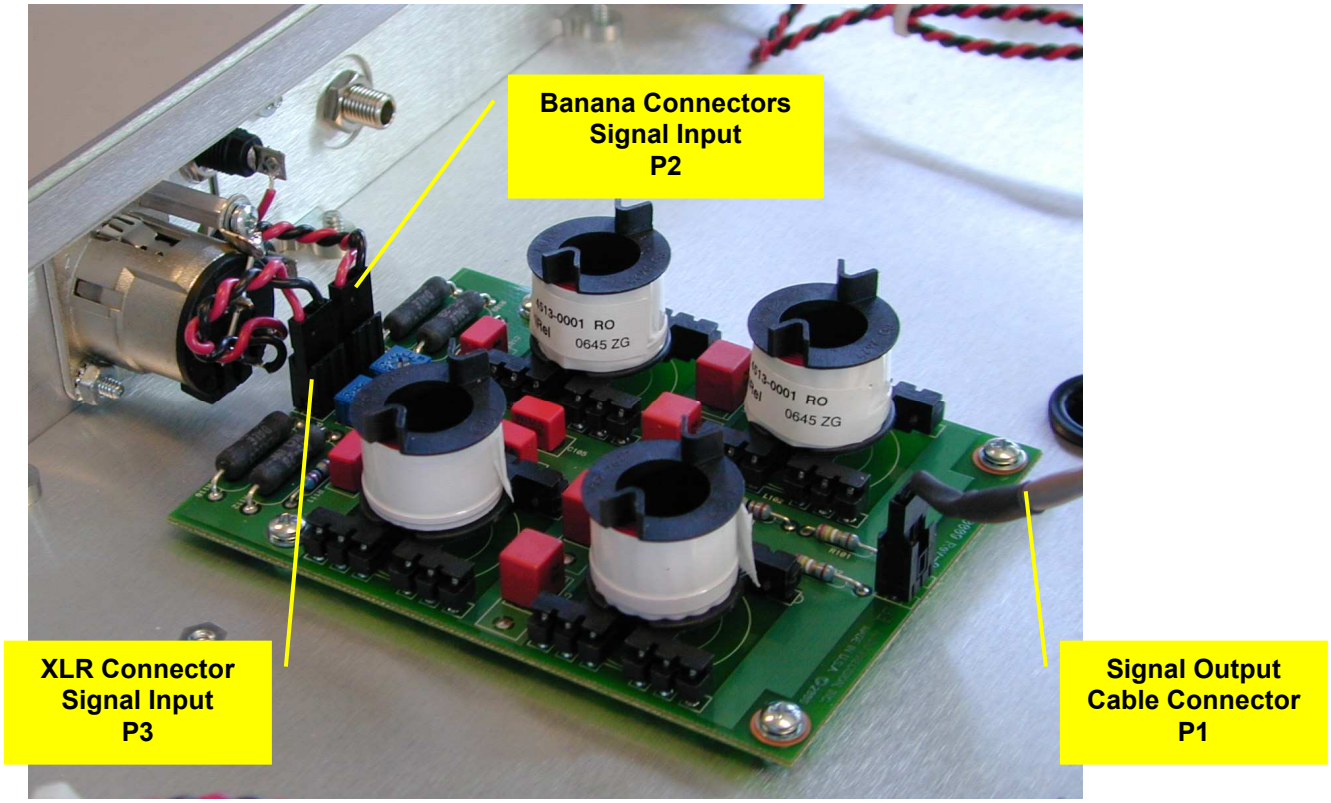

Figure 1

View of one of eight Filter Modules installed in an APX-581

5. Carefully disconnect the connectors from one of the APX-581 Filter modules. Do not disconnect and remove all the cables from all the modules, as the signal cables are not labeled and there could be reconnection errors with the cabling.
6. Remove the four screws that secure the APX-581 Filter module to the Chassis Plate. Save the screws for re-installation of the Filter module.

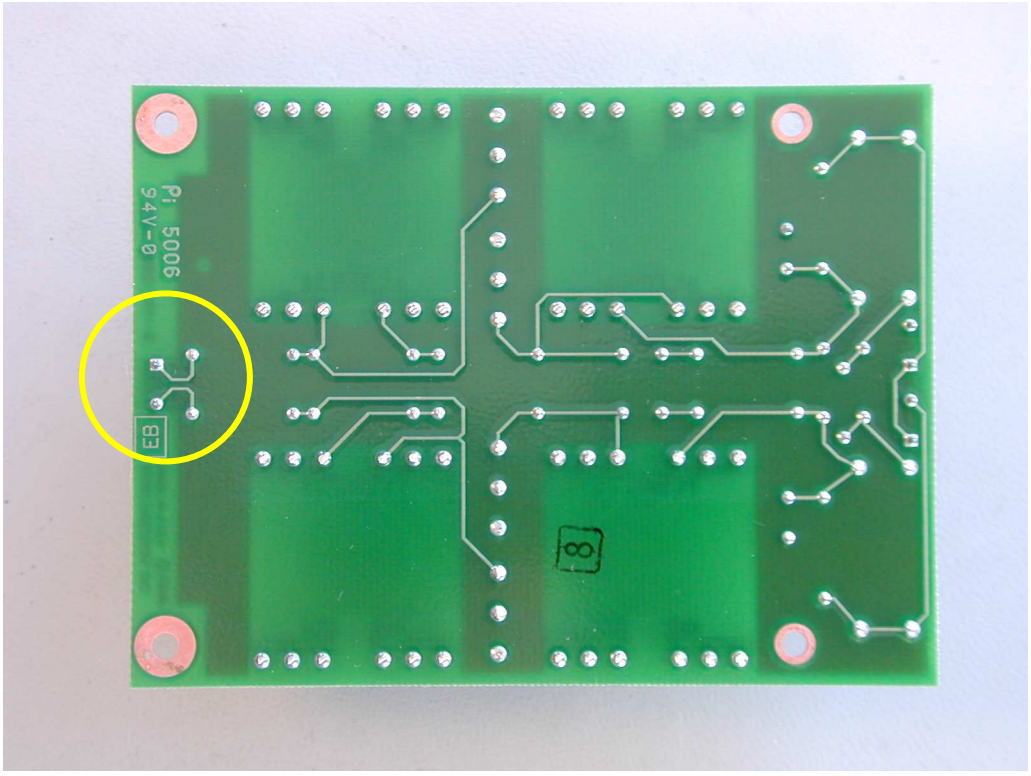

Figure 2

Close up view of the bottom of an un-modified APX-581 Filter module. The area of modification is circled in yellow.

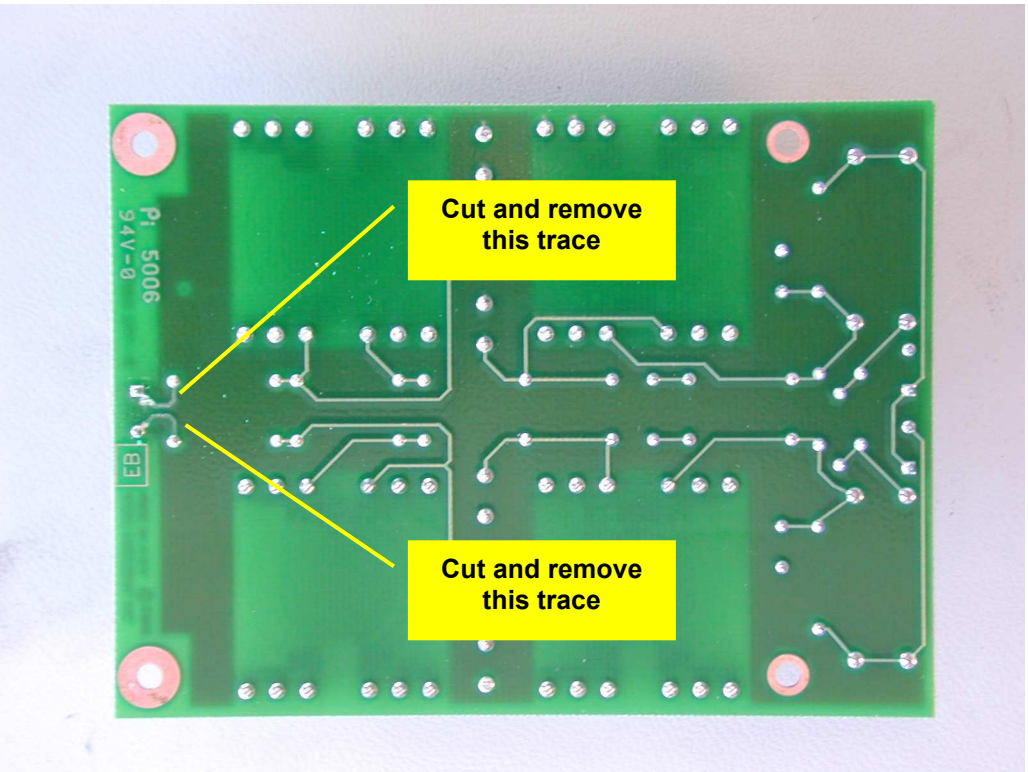

Figure 3

Close up view of the bottom of an APX-581 Filter module with the traces cut and removed.

7. Carefully cut and remove the two traces noted in Figure 3. Do not remove the solder pad connections for Connector P1 or the resistor solder pad connections. These connections will be used to solder the 1 MFD capacitors.

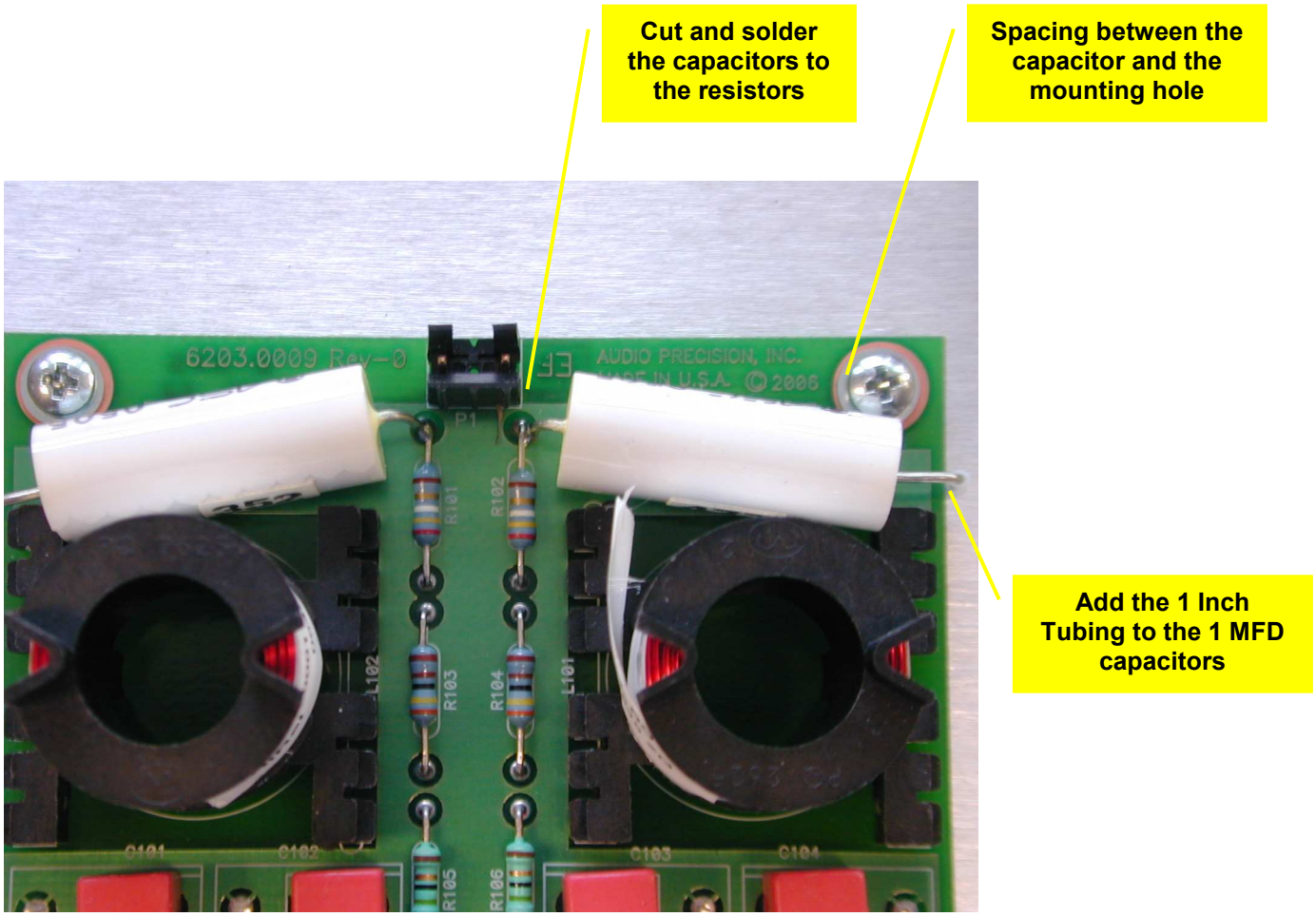

Figure 4

Close up view of the top of an APX-581 Filter module with the 1 MFD capacitors installed.

8. From the modification kit locate the plastic tubing. Cut the tubing into 16 pieces, 1 inch long.
9. Insert one of the 1 inch long tubing on to one end of the 1 MFD capacitor as show in Figure 4.
10. Cut and bend the capacitors leads as show in Figure 4.
11. Solder both capacitor leads to the resistors on the top side of the APX-581 Filter modules as shown in Figure 4.
12. Be sure to mount the 1 MFD capacitors with the spacing between the end of the capacitor and the APX-581 Filter module mounting holes as shown in Figure 4.

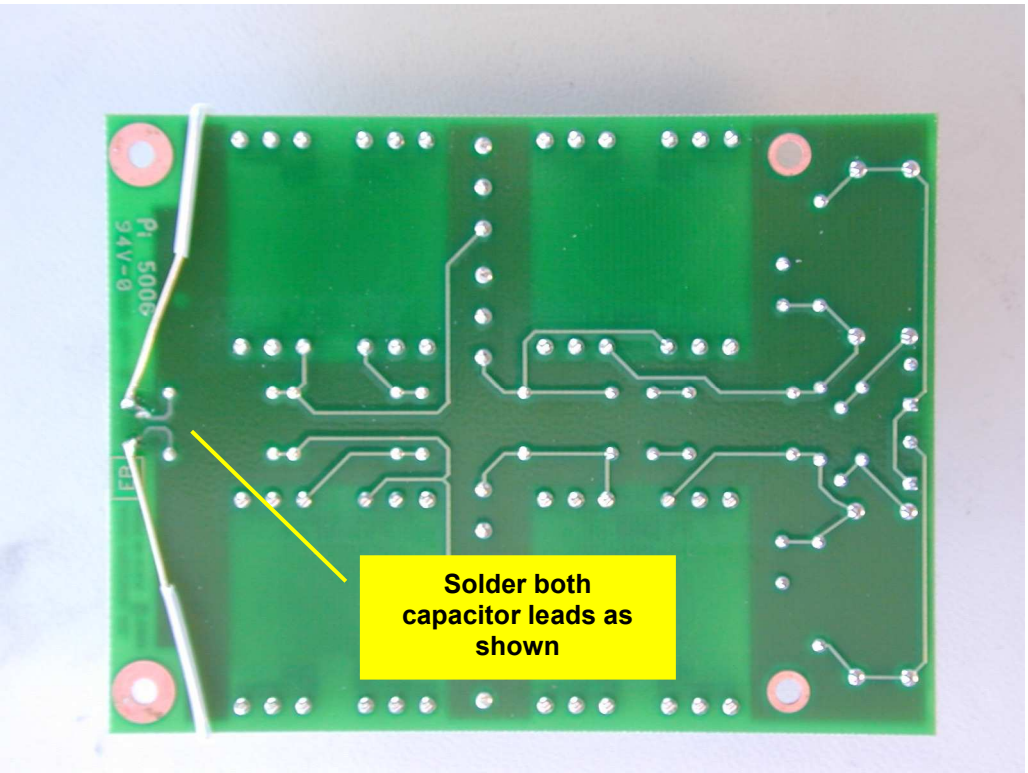

Figure 5

Close up view of the bottom of an APX-581 Filter module with the soldered Capacitor leads.

13. Cut and solder the leads of the 1 MFD capacitors to the bottom of the APX-581 circuit board as shown in Figure 5. Be sure to leave space between the circuit board mounting holes and the capacitor leads as shown in Figure 5.
14. Clean all solder joints with approved solder flux remover.
15. Inspect all solder joints for proper joints.
16. Inspect the modifications for correct connections.
17. Place the APX-581 module into the same position the module was originally installed. Attach the 4-40 screws that secured the module to the chassis plate.
18. Reconnect the cables as show in Figure 1.
19. Remove, modify, and re-install one by one each of the APX-581 modules until all eight modules have been modified.

20. Testing of the completed modules?
21. Reassembling the instrument.

This completes the modifications for the APX-0003 Service Advisory Bulletin

Testing for Optimal Results

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FAX : 503-641-8906
US Toll Free: 1-800-231-7350

audioprecision.com

060707jd

Service Advisory Bulletin APX.0004
Failure of APx500 software to recognize the APx585 or APx586 instrument

Date: June 2008

To: All Audio Precision Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Troubleshooting the power supplies, BZOD memory, and BZOD module when APx500 software fails to recognize the APx585 or APx586 instrument.

Summary:

Audio Precision has discovered certain rare failure conditions that will prevent the APx500 software from recognizing the APx585 or APx586 instrument. This Service Advisory Bulletin goes through the necessary steps to check the power supplies, BZOD memory, and BZOD module in order to locate and correct the problem.

This service advisory covers the Audio Precision APx585 and APx586.

Tools and Required Materials:

- #2 Phillips screw driver.
- Static-protection wrist strap or other grounding device.
- APx585/586 service manual.

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

Troubleshooting Procedure:

Verification

1. Verify the following before proceeding, to rule out other common connectivity issues:
   - The instrument is connected to the AC mains and the power indicator is lit.

- A good USB cable is connected between the instrument and the controlling computer.
- Launching the APx585 operating software produces the error message “APX Hardware not properly installed or powered on and will run in Demo Mode”.
- The instrument was previously operating correctly with the attached computer.

2. If the instrument meets the above conditions, continue with the troubleshooting procedure.

Power Supply Checks

3. Disconnect the AC mains cord and USB cable from the APx585/586 instrument.
4. Remove the top cover
5. Reconnect the AC mains cord and press the front panel power switch to turn on the instrument. Do not reconnect the USB cable.
6. Inspect the LED indicators (figure 1 point A and B) on the module located in between the power supply module (figure 1 point C) and the support frame (figure 1 point D).

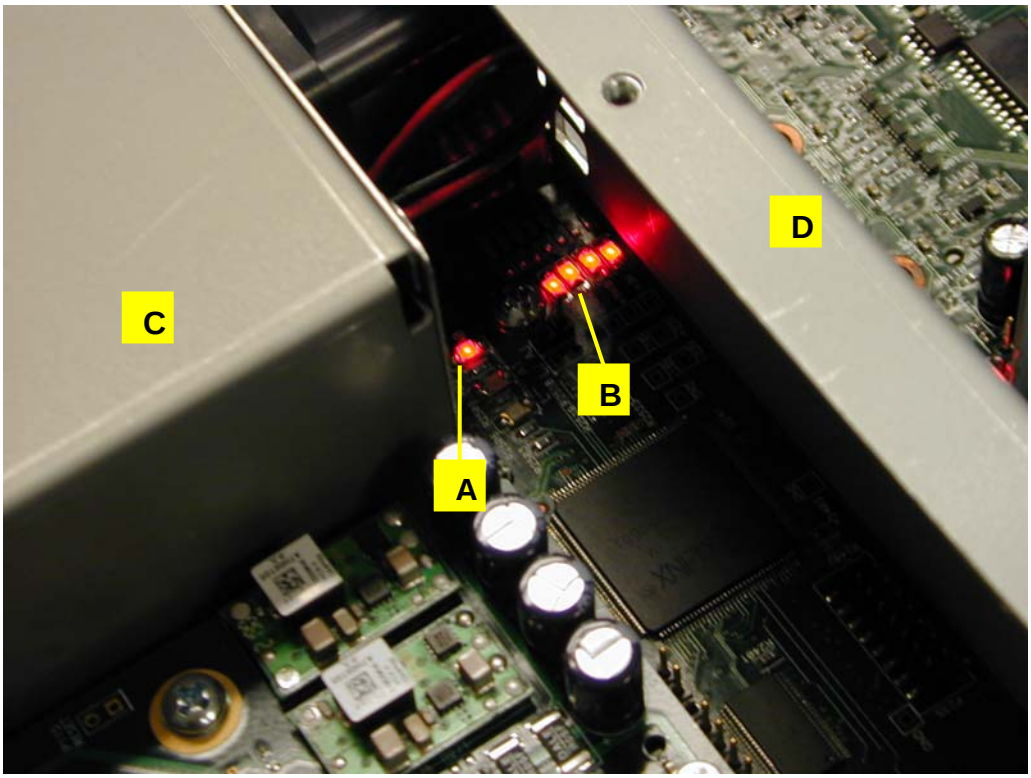

Figure 1 Power supply indicators

7. The LED indicator at point A should be flashing at a slow rate.
8. The LED indicators at point B should be lighted and not flashing.
9. These LED indicators show the status of the various DC supply rails in the instrument. If any of the power supply LED indicators are not lighted as shown in figure 1, the power supply module (point C) may be failing and need to be repaired or replaced.

BZOD Module Checks

10. The LED indicators located on the BZOD module (figure 2) will indicate the instrument status during the initial instrument start up and launch of the APx500 control software.

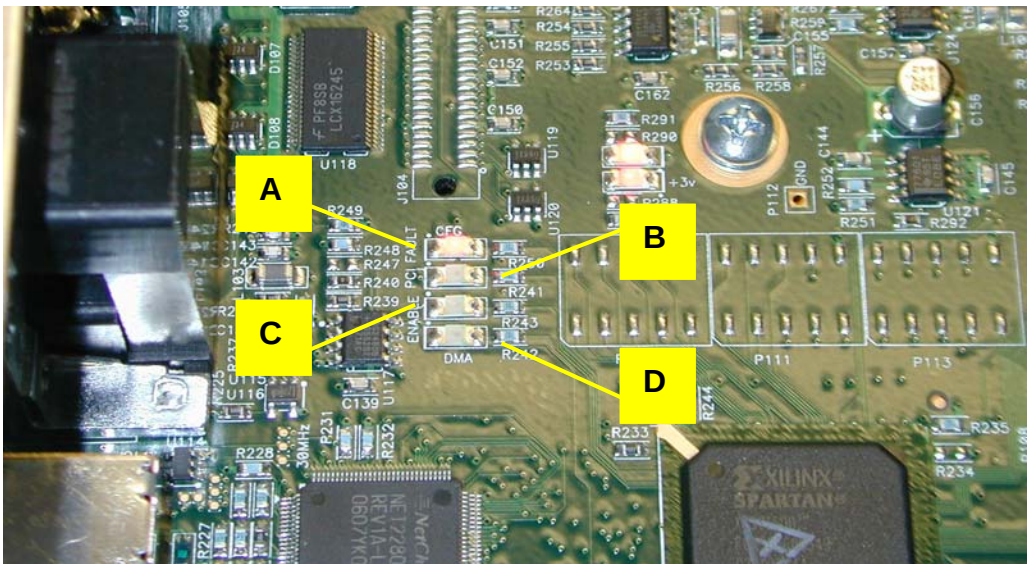

Figure 2 BZOD module

11. Power off the instrument, and then power it on while observing the LED indicators. During the initial start-up of the APx585 instrument, the BZOD module LED indicators shown in figure 2 will be as follows:
    - Point A = On
    - Point B = Off
    - Point C = Off
    - Point D = Off.
12. Now, launch the APx500 software and observe that the LEDs show as follows:
    - Point A = On
    - Point B = Off
    - Point C = On
    - Point D will be flashing On and Off.
13. If all the BZOD module LED indicators are lighted, then the memory assembly (figure 3 point A) on the BZOD module may not be fully inserted into the mounting socket (figure 3 point B).

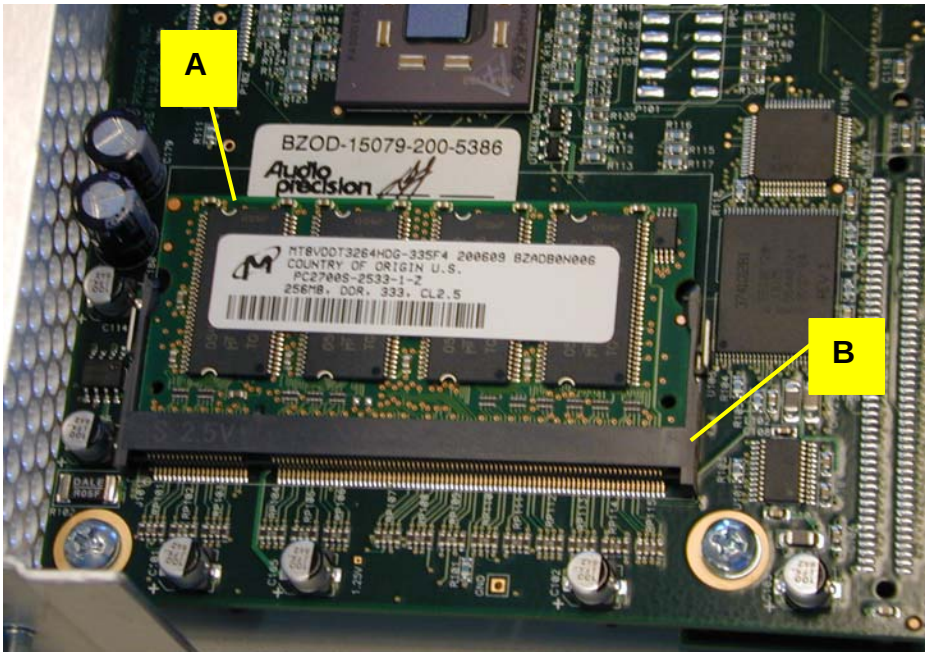

Figure 3 BZOD module and BZOD memory module

14. To reseat the memory module, disconnect the AC mains cord from the instrument, and remove the memory assembly from the mounting socket. Re-install the memory assembly into the mounting socket. Re-connect the AC mains cord and observe the LED indicators for the correct On or Off sequences described in steps 11 and 12. If the LED indicators are lighted correctly, replace the instrument cover and conduct a Performance Check of the APx585 instrument.
15. If the BZOD module LED indicators still do not indicate the correct On and Off indications, then it is recommended to replace the BZOD module. Contact Jim Duncan (jimd@ap.com) to obtain replacement modules for APx585 instruments, and proceed with the following steps to replace it.

Replacing the BZOD module

16. Power off the instrument and remove the AC mains cord.
17. On the rear panel, remove the six threaded studs that secure the connectors A, B, and C in figure 4.

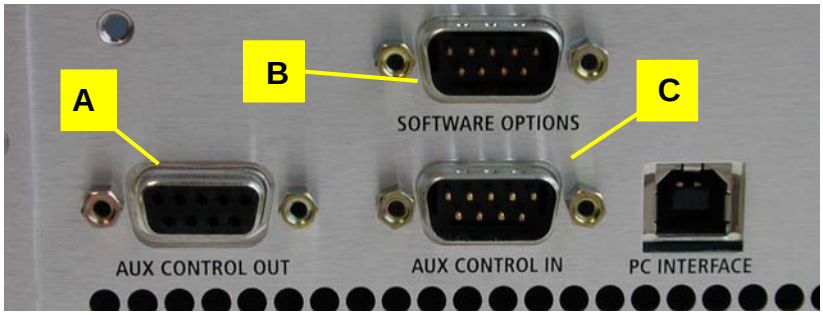

Figure 4 APx rear panel

18. Save the threaded studs. These will be re-used to secure the new BZOD module.
19. Locate and remove the five screws that secure the BZOD module as shown in figure 5 (Points A, B, C, D, & E). Save the screws for the installation of the new BZOD module.

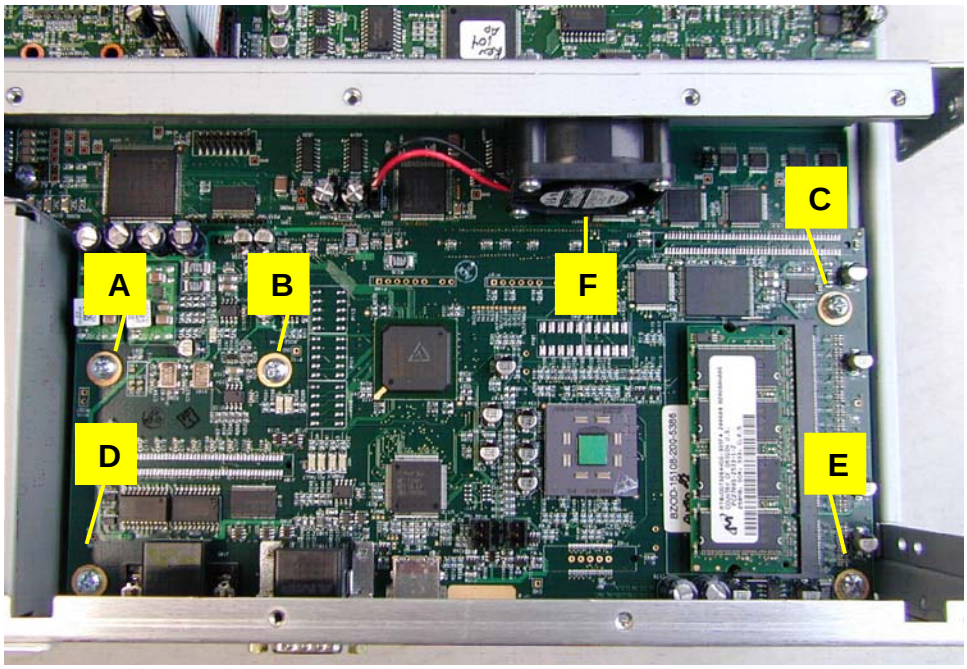

Figure 5 BZOD module screws

20. Remove the BZOD module while gently pushing the fan at point F out of the way.
21. Install the new BZOD module, replacing the five screws removed in step 18 and the threaded studs removed in step 16.
22. Power on the APx585 instrument and check the LED indicators for proper operation as described in steps 11 and 12.
23. If replacing the BZOD Module and memory assembly do not restore the instrument to operating conditions, contact Jim Duncan (jimd@ap.com) to obtain Factory Service of the APx585 instrument.

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VIII0701141600

Service Advisory Bulletin APX.0005
Replacement of Early HDMI Modules in APx585 Instruments

Date: July 2008

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Replacement of early HDMI modules in APx585 instruments with the current production version.

Summary:

A small number of APx585 instruments were shipped with an early version of the HDMI module that is incompatible with APx500 software version 2.2 and later. This bulletin gives instructions for replacing the HDMI module with the current version, and then testing the instrument.

This service advisory covers the Audio Precision APx585.

Tools and Required Materials:

- #2 Phillips screw driver.
- Static-protection wrist strap or other grounding device.

Parts List:

Qty	Part Number	Description
1	BHDM.0000	HDMI Module
1	8411.1725	APx500 version 2.2 measurement software
1	8411.1726	APx Resources Disc

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

HDMI Module Replacement Procedure:

Replacement

1. Remove both the top and bottom covers of the APx instrument. Turn the instrument upside down.
2. Remove the four screws that secure the HDMI front panel to the instrument, as shown in figure 1.

Figure 1 Front panel screws

3. Remove the four screws that secure the HDMI circuit board (BVID), as shown in figure 2.

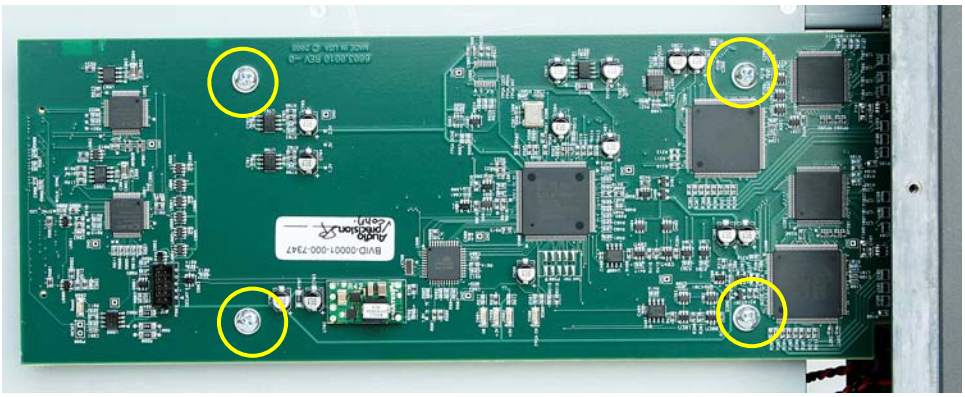

Figure 2 BVID circuit board screws

4. Gently lift the end of the BVID board to unplug it from the connector, as shown in figure 3.

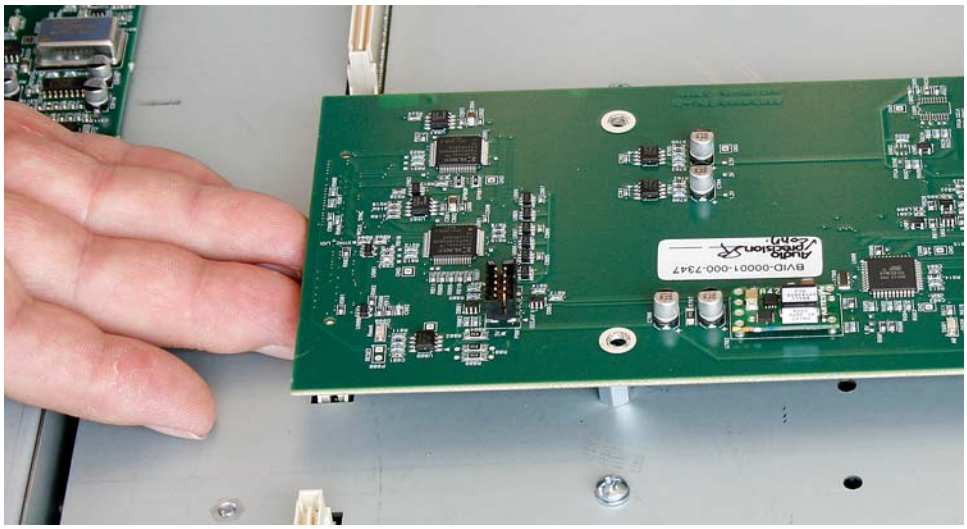

Figure 3 Unplugging the BVID board

5. Slide the old HDMI module out the front of the instrument. Note that it will be necessary to tilt it, as shown in figure 4, to clear the front panel.

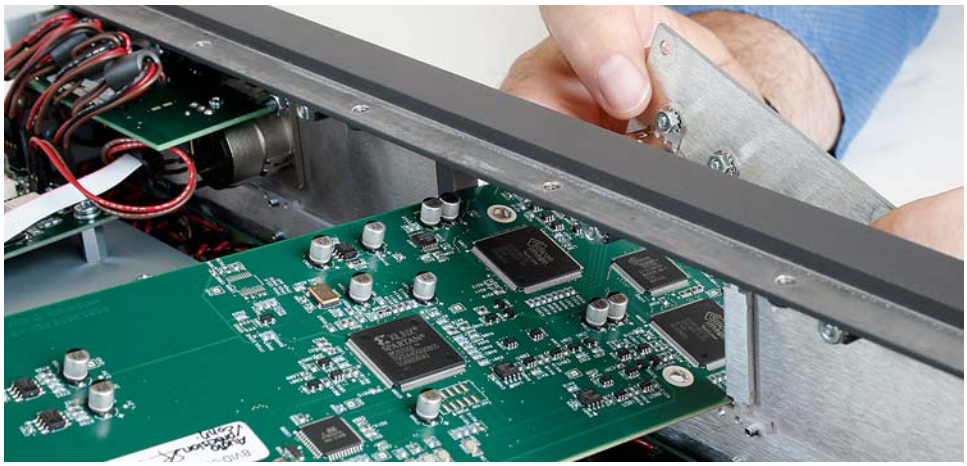

Figure 4 Removing the old HDMI module

6. Insert the new HDMI module through the front panel, tilting it as shown in figure 4. Push the end of the card into the connector, and replace the four circuit board screws and the four front panel screws.
7. Upgrade the APx500 measurement software to version 2.2 or higher.

Power Supply Checks

8. Turn the instrument over so it is right side up.
9. Attach the AC mains cord and turn on the instrument.

10. Inspect the LED indicators (figure 5 point A and B) on the module located in between the power supply module (figure 5 point C) and the support frame (figure 5 point D).

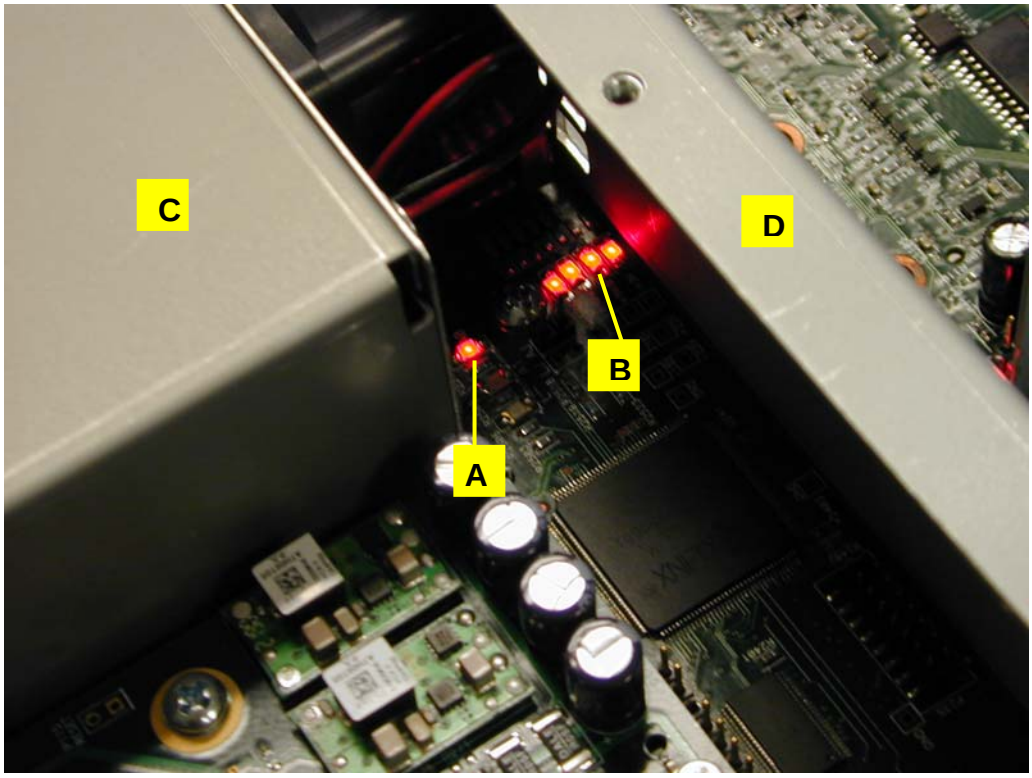

Figure 5 Power supply indicators

11. The LED indicator at point A should be flashing at a slow rate.
12. The LED indicators at point B should be lighted and not flashing.
13. These LED indicators show the status of the various DC supply rails in the instrument. If any of the power supply LED indicators are not lighted as shown in figure 5, double check that the HDMI module has been correctly installed.

BZOD Module Checks

14. The LED indicators located on the BZOD module (figure 6) will indicate the instrument status during the initial instrument start up and launch of the APx500 control software.

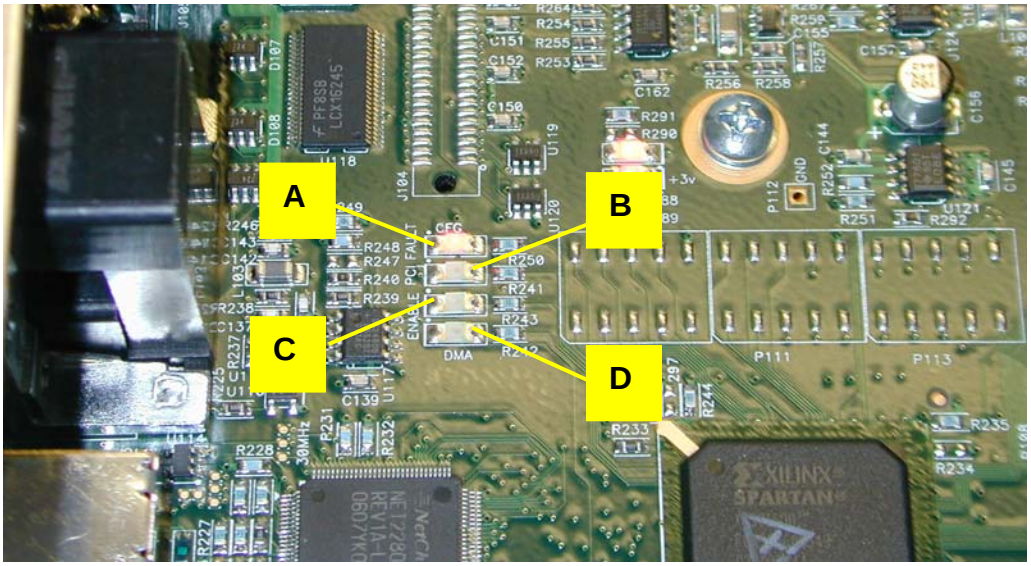

Figure 6 BZOD module indicators

15. Power off the instrument, and then power it on while observing the LED indicators. During the initial start-up of the APx585 instrument, the BZOD module LED indicators shown in figure 6 will be as follows:
    - Point A = On
    - Point B = Off
    - Point C = Off
    - Point D = Off.
16. Now, launch the APx500 software and observe that the LEDs show as follows:
    - Point A = On
    - Point B = Off
    - Point C = On
    - Point D will be flashing On and Off.

Performance Checks

17. Run the APx performance check procedure, and then the APx HDMI performance check procedure, to verify that the instrument is operating properly.
18. If the instrument fails the BZOD module checks or the performance checks, contact Jim Duncan (jimd@ap.com) to obtain factory service for the APx585 instrument.

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VIII0702101200

Service Advisory Bulletin APX.0006
Correction of 50 kHz Response Peak in APx585/586 Instruments

Date: July 2008

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Correction of 0.01dB response peak at 50 kHz in APx585/586 instruments with BCAS Analog Input board revision 201.

Summary:

APx585 and APx586 instruments with BCAS Analog Input board revision 201 may fail calibration due to a response peak of 0.01dB at 50 kHz. This bulletin gives instructions for replacing two resistors in each input channel, and then testing the instrument. Instruments with BCAS Analog Input board revision 202 and higher do not need to be modified.

Tools and Required Materials:

- #1 Phillips screw driver.
- Static-protection wrist strap or other grounding device.
- Surface mount device (SMD) soldering equipment.

Parts List:

Qty	Part Number	Description
16	1176.5629	Resistor 56.2 Ohms 1/8 Watt 1% SMD 1206 (RoHS compliant)

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

BCAS Module Upgrade Procedure:

1. Use a #2 Phillips screwdriver to remove the ten 4-40 gray painted screws that secure the instrument top cover. Save these screws for re-installing the top cover later. If the instrument is an APx586, then also remove the 18 gray 4-40 screws and 6 unpainted 4-40 screws that secure the bottom cover.

Important: Use the appropriate SMD tips and/or hot air tool to remove and replace the SMD resistors. Use of improper tools may damage the components and the circuit board.

2. Change resistors R105 and R112 in input channel 1 of the BCAS module from 59.0 Ohms to 56.2 Ohms using the AP part specified above or its equivalent. Do the same for input channels 2 – 7 (R205/R212,…). See the resistors highlighted in figure 1.

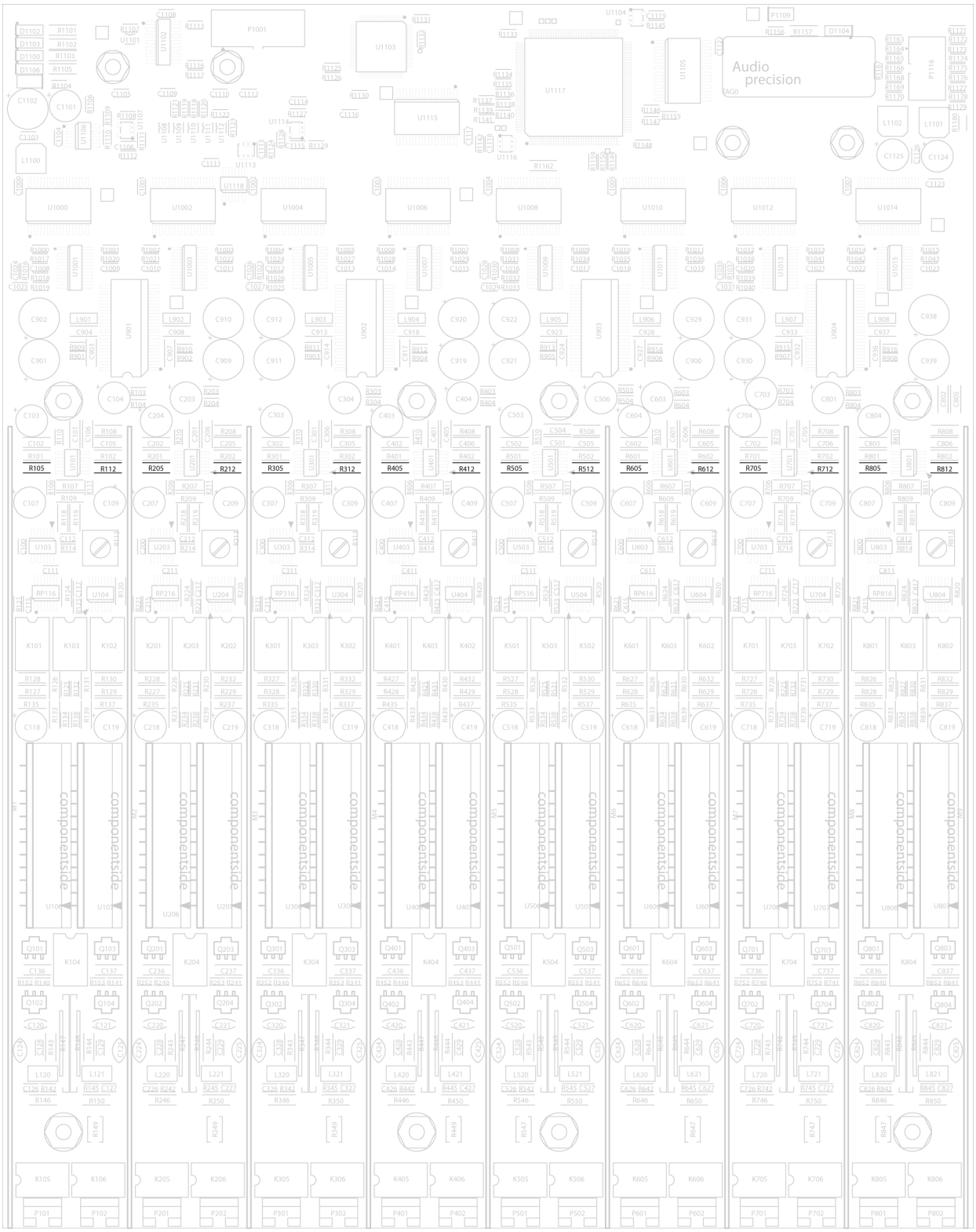

Figure 1 BCAS module with resistors highlighted.

3. If the instrument is an APx586, turn it over and make the same replacements on the other BCAS module.
4. On the BCAS module identification sticker, if the revision number is 201, correct it to say 202.
5. Run the adjust585-586v2.2.approj from the APx Service Disc to readjust the BCAS module(s).
6. Run the performance check APx585PerformanceCheckv2_2.approj or APx586PerformanceCheckv2_2.approj as appropriate from the APx Resources Disc to verify correct operation of the instrument and the Digital I/O module. Then run DigitalBalancedPerformanceCheckV2_2.approj to verify correct operation of the balanced digital I/O connections.
7. If the instrument was calibrated, re-calibrate the instrument.
8. Replace the top and bottom covers.

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VIII0729153700

Service Advisory Bulletin APX.0007
Measurement Errors in Digital Loopback Mode

Date: July 2008

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Measurement errors in digital loopback mode in APx585 and APx586 instruments.

Summary:

When the APx-585 or APx-586 AES digital signal path setup is in digital loopback mode at sample rates higher than 48 kHz, the digital receiver may overload and display inaccurate measurements. Modifying the BAES module to reduce the signal level of the digital generator to analyzer signal path eliminates the probability of overloading the digital receiver and producing inaccurate measurements.

This bulletin gives instructions for making a small circuit modification and testing the instrument. The BAES board is part of the model 110 Digital I/O module with balanced XLR connectors. This modification does not apply to instruments that contain the earlier model 109 Digital I/O module without XLR connectors.

This service advisory applies to the following Audio Precision instruments:

- APx585 and APx586 with model 110 Digital I/O module, and BAES module revision 000, 001, or 002. Instruments with BAES module revision 003 or higher do not need to be modified.

Tools and Required Materials:

- #1 Phillips screw driver.
- Static-protection wrist strap or other grounding device.
- Surface mount device (SMD) soldering equipment.

Parts List:

Qty	Part Number	Description
2	1176.1500.1	Resistor 150 Ohms 1/8 Watt 1% SMD 0603 (RoHS compliant)

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

BAES Module Upgrade Procedure:

1. Use a #2 Phillips screwdriver to remove the 18 gray 4-40 screws and 6 unpainted 4-40 screws that secure the bottom cover.

Important: Use the appropriate SMD tips and/or hot air tool to remove and replace the SMD resistors. Use of improper tools may damage the components and the circuit board.

2. Locate the BAES module on the bottom of the instrument behind the Digital I/O module. See figure 1.

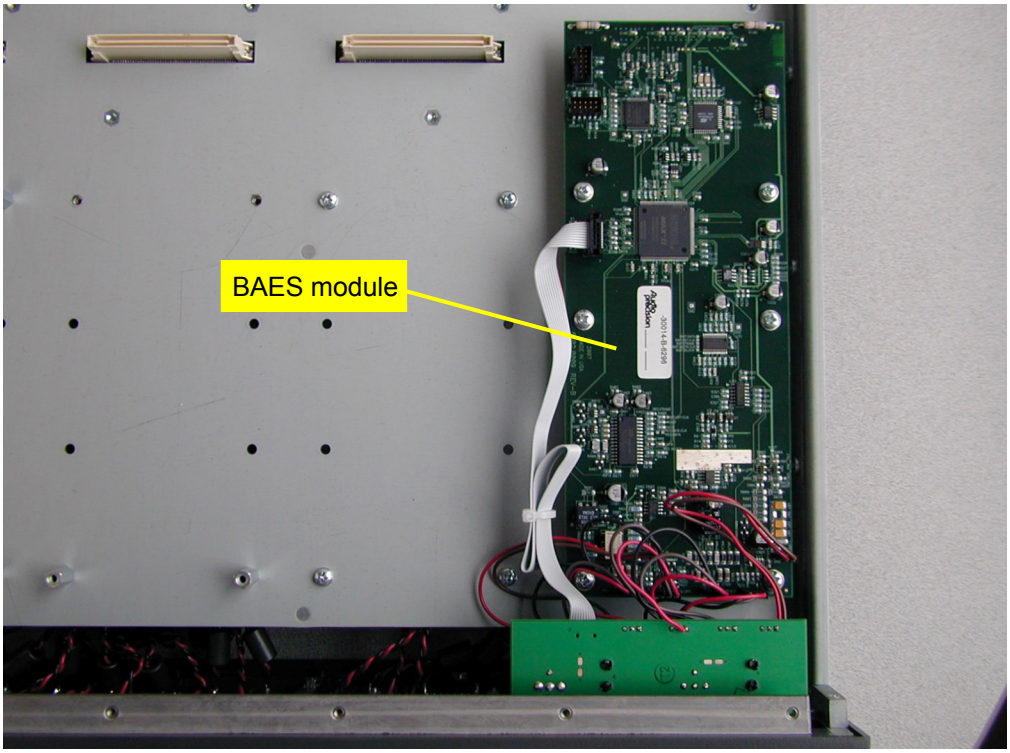

Figure 1 BAES Digital I/O module.

3. Note the modification area on the circuit board layout in figure 2.

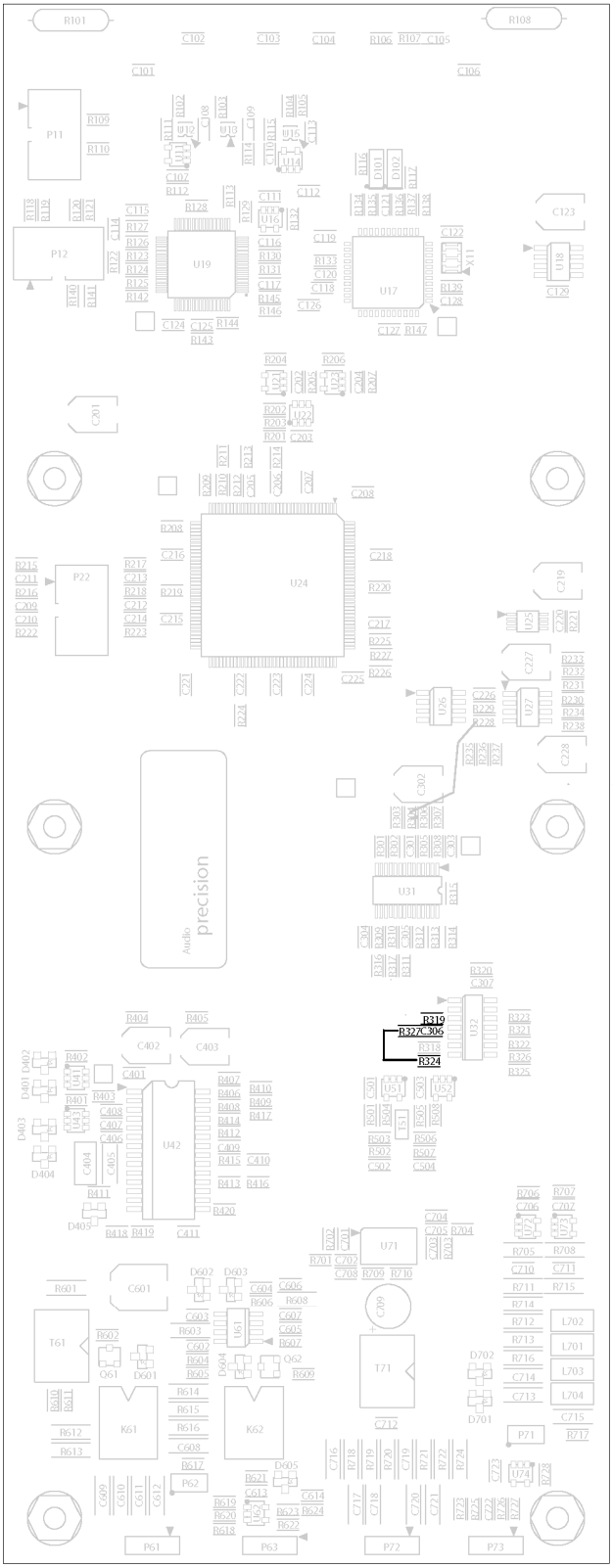

Figure 2 BAES module with modified area highlighted.

4. Change R319 to from 49.9 Ohms to 150 Ohms, as shown in figure 3.
5. Add a new 150 Ohm resistor (R327) next to C306, as shown in figure 3.
6. Add a jumper wire between R327 and R324 as shown in figure 3.

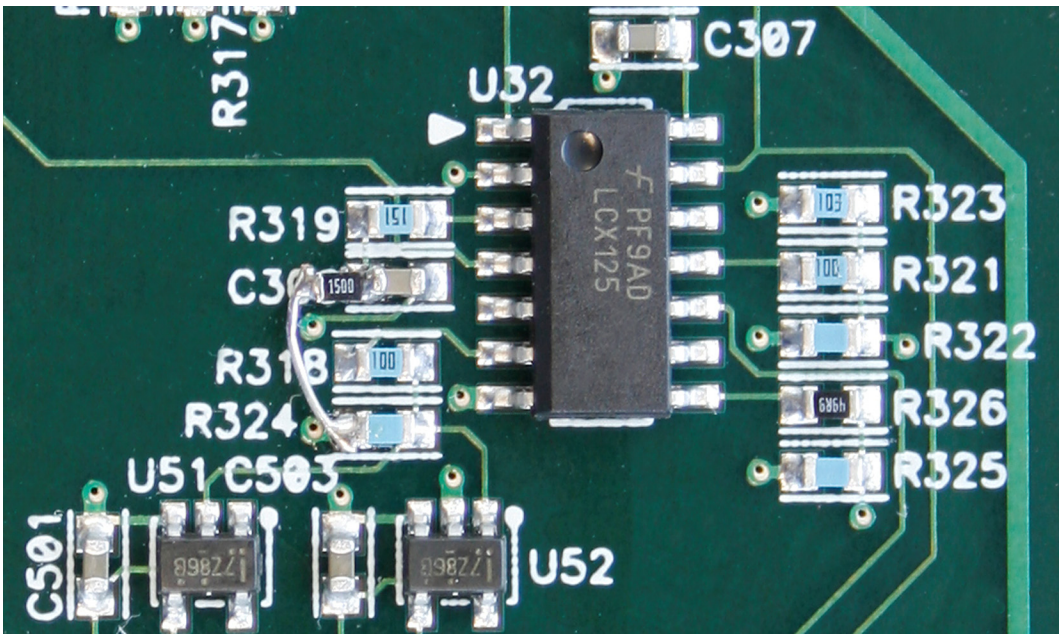

Figure 3 BAES modification close-up.

7. On the BAES module identification sticker, if the board rev says 002, change it to say 003. If the board is rev 000 or 001, do not change the revision but add "w ECO 08-50."
8. Run the performance check APx585PerformanceCheckv2_2.approj or APx586PerformanceCheckv2_2.approj as appropriate from the APx Resources disc to verify correct operation of the instrument and the Digital I/O module. Then run DigitalBalancedPerformanceCheckV2_2.approj to verify correct operation of the balanced digital I/O connections.
9. If the instrument was calibrated, re-calibrate the instrument.
10. Replace the bottom cover.

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VIII0729154300

Service Advisory Bulletin APX.0008
Playback Error of Non-192 kHz Files with APx585/586

Date: August 2008

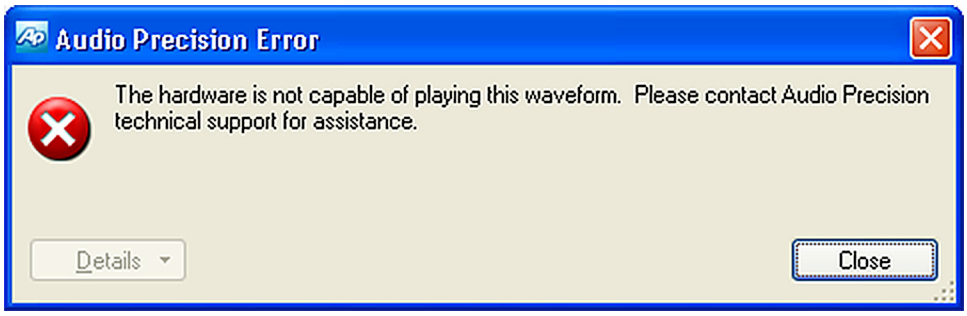
To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Playback error of non-192 kHz files in APx585 and APx586 instruments with older BPLX analog output modules.

Summary:

Early APx585 and APx586 instruments with BPLX module revisions 100–106 and 300 did not properly support waveform file playback through the analog outputs at sample rates other than 192 kHz. Playback through the digital outputs is not affected. APx500 v2.2 and later measurement software requires lower sample rates to use the waveform file playback feature. Trying to play back a non-192 kHz file with the analog outputs selected will result in the following error message:



Correcting this issue requires a firmware upgrade on the BPLX board. US customers will need to contact Jim Duncan (jimd@ap.com) to arrange an RMA. Normal factory service fees apply. European and Asian customers will need to contact their distributor to exchange their current BPLX board for either version 107, or 301 or later.

To identify the current BPLX version, in the APx500 measurement software, go to Help>About, scroll to “8-Channel Analog Output Board”, and under Component Details, read the last three digits in the first line. For example, if the first line reads “ID: BPLX-15095-105”, then the version is 105.

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VIII0806132300

Service Advisory Bulletin APX.0010
Rare Audio Bit-stream Corruption with Coded Audio

Date: February 2009

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Rare audio bit-stream corruption with coded audio.

Applies to: APx585 with HDMI main board BVID rev 000.

Summary:

HDMI option modules with BVID circuit board module revision 000 may on rare occasions exhibit audio bit-stream corruption. The Sil9135CTU receiver component has been identified as the source of the corrupted audio bit-stream by its manufacturer. BVID module revisions 001 or higher now use the improved Sil9135ACTU receiver. Revision 000 modules that exhibit corrupted audio bit-stream data on a semi-regular basis should be replaced with modules that are revision 001 or higher. The BVID revision level can be identified from the Help > About menu selection in the APx500 Measurement Software.

Tools and Required Materials:

- #1 and #2 Phillips screwdrivers.
- Static-protection wrist strap or other grounding device.

Parts List:

Qty	Part Number	Description
1	BHDM.0000	HDMI Module
1	8411.1725	APx500 Measurement Software
1	8411.1726	APx Resources Disc

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

HDMI Module Replacement Procedure:

Replacement

1. Using a #2 Phillips screwdriver, remove both the top and bottom covers of the APx instrument. Turn the instrument upside down.
2. Using a #1 Phillips screwdriver, remove the four screws that secure the HDMI front panel to the instrument, as shown in Figure 1.

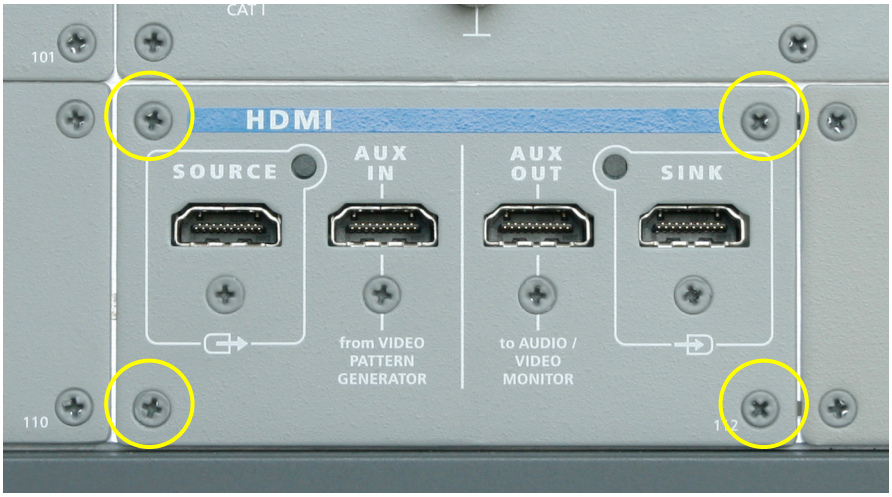

Figure 1 Front panel screws

3. Remove the four screws that secure the HDMI circuit board (BVID), as shown in Figure 2.

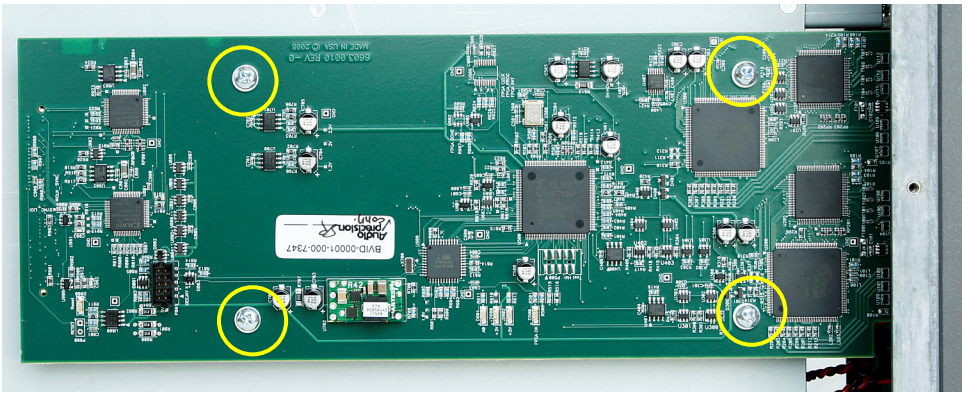

Figure 2 BVID circuit board screws

4. Gently lift the end of the BVID board to unplug it from the connector, as shown in Figure 3.

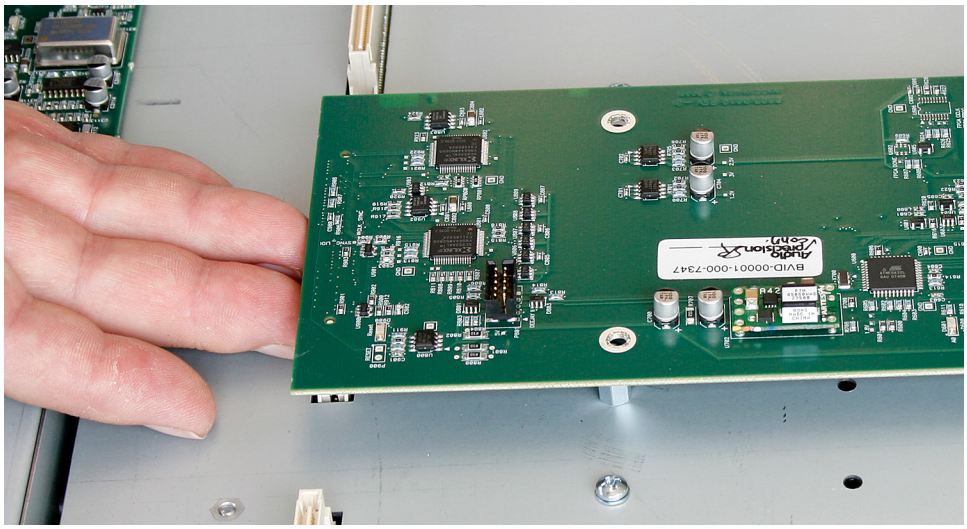

Figure 3 Unplugging the BVID board

5. Slide the old HDMI module out the front of the instrument. Note that it will be necessary to tilt it, as shown in Figure 4, to clear the front panel.

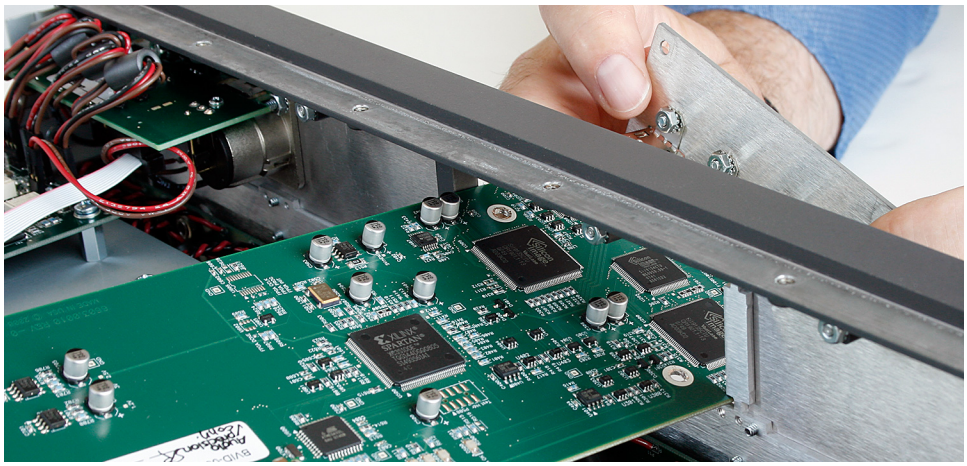

Figure 4 Removing the old HDMI module

6. Insert the new HDMI module through the front panel, tilting it as shown in Figure 4. Push the end of the card into the connector, and replace the four circuit board screws and the four front panel screws.

Power Supply Checks

7. Turn the instrument over so that it is right side up.
8. Attach the AC mains cord and turn on the instrument.
9. Inspect the LED power supply indicators (Figure 5) on the BRIO module located in between the Power Supply module (Point C) and the support frame (Point D). The LED indicator at Point A should be flashing at a slow rate. The LED indicators at Point B should be lighted and not flashing.

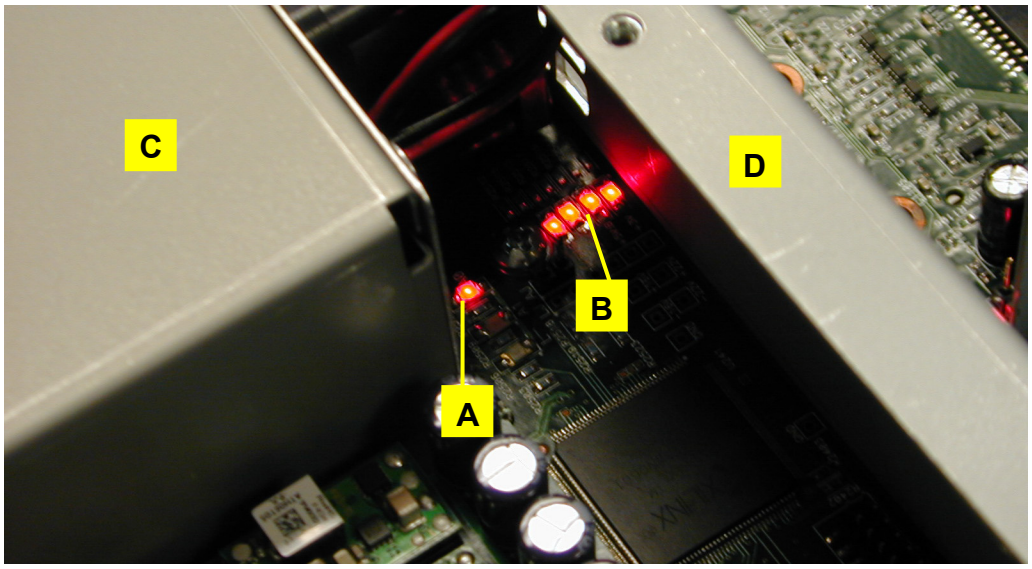

Figure 5 Power supply LED indicators on the BRIO Distribution module.

BZOD Module Checks

10. The LED indicators located on the CPU/USB module (BZOD) (Figure 6) will indicate the instrument status during the initial instrument start up and launch of the APx500 Measurement Software.

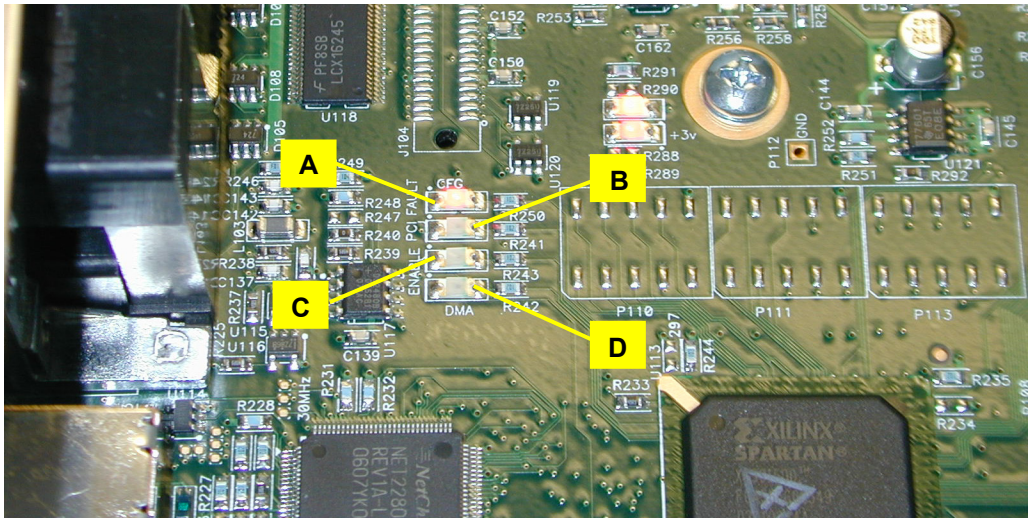

Figure 6 BZOD module LED indicators.

11. Power off the instrument, and then power it on while observing the LED indicators. During the initial start-up of the APx instrument, the state of the BZOD module LED indicators at each point shown in Figure 6 will be as follows:
    - A = On
    - B = Off
    - C = Off
    - D = Off
12. Now, launch the APx500 software and observe that the LEDs indicate as follows:
    - A = On
    - B = Off
    - C = On
    - D = Flashing

Performance Checks

13. Run the performance check project (APx585PerformanceCheckVx_x.approj) for the instrument. The performance check files may be obtained from the APx Resources disc or the AP website. Also run the separate HDMI performance check project (HdmiPerformanceCheckVx_x.approj) to verify that the new HDMI module is performing correctly.
14. If the instrument fails the power supply, BZOD, or performance checks, verify that the HDMI module has been installed and connected correctly.
15. If the instrument still fails the checks or otherwise fails to function properly, please contact Jim Duncan at Audio Precision (jimd@ap.com) to obtain factory service for the instrument.
16. If all checks pass, replace the top and bottom covers that were removed in Step 1.
17. Opening the case voids calibration. If the instrument was previously calibrated, it should be re-calibrated at this time.

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IX0824174700

Service Advisory Bulletin APX.0012
Optical Transmitter and Receiver Compatibility

Date: July 2009

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Compatibility of old and new type optical transmitter/receiver components with various Digital I/O module board revisions.

Applies To: APx525, 526, 585, and 586 manufactured before May 2009.

Summary

The APx AES Digital Input/Output module is composed of two sub-modules: a main module (BAES), and a front panel module (BSOP). The BSOP module contains optical transmitter and receiver components that are no longer available and have been replaced with new parts in current production. This change also has required revision of the BAES module. Therefore, when servicing the Digital I/O module, it is important to check the sub-module serial number labels to make sure that the optical components and the BAES module are the correct match. Installation of optical components that are not correctly matched will cause less than optimum performance of the AES digital optical signals. Audio Precision has sufficient stock of the older optical components for service.

DIGITAL I/O OPTICAL COMPONENTS AND COMPATIBLE MODULE REVISIONS:

Optical Components		**AES Digital I/O Modules**	
AP Part No.	**Manu. Part No.**	**BSOP Revision No.**	**BAES Revision No.**
3640.RCVT	TX142L	BSOP-XXXXX-100* and BSOP-XXXXX-101*	BAES-XXXXX-000 through BAES-XXXXX-004
3640.RCVR	RX142L		
3640.147T	TX147L	BSOP-XXXXX-102 and higher	BAES-XXXXX-100 and higher
3640.147R	RX147L		

* This revision was manufactured with the older optical components. Check, however, that it has not already been refitted with the new ones.

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IX0724133700

Service Advisory Bulletin APX.0013
Failure of RFI Suppression Capacitors on Analog I/O Panels

Date: August 2009

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: APx models 520, 521, 525, 526, 585, and 586 manufactured before December 13, 2008.

Action: Audio Precision requires the replacement of the Analog Input and Output panels on instruments that are returned for service or calibration.

Summary:

The unbalanced BNC analog signal connectors used on all APx Analog Input and Output panels have RFI (radio frequency interference) suppression capacitors. The capacitors are mounted between each BNC shell and the chassis frame. Instruments manufactured before December 13, 2008 used SMT capacitors that may fail due to mechanical stress or vibration, resulting in reduced EMI suppression. Failure of the capacitors will not alter an instrument's ability to meet factory specifications.

Audio Precision requires the replacement of Analog Input and Output Panels that use SMT (surface mount) capacitors with new panels that use axial lead capacitors on all APx500 series instruments manufactured before December 13, 2008 that are returned for service or calibration. Affected APx instruments that already contain new panels will have "SAB-13" written on the rear panel label.

To determine the date of manufacture, read the label on the rear panel, or go to Help|About in the APx500 Measurement Software and read the manufacturing date for the Analog Input and Output modules.

Tools and Required Materials:

- #1 and #2 Phillips screw driver.
- Static-protection wrist strap or other grounding device.

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Parts:

Once it is verified that the panels need replacement, order new panels according to the following table. After completing the replacement, return the old panels to Audio Precision.

Table 1 Analog front panel module part numbers.

Instrument	Output Panel	Input Panel	Additional Input Panel
APx520	BAOU.2000	BAIN.2000	n/a
APx521	BAOU.2000	BAIN.2000	BAIN.3000 (chan 3/4)
APx525	BAOU.2000	BAIN.2000	n/a
APx526	BAOU.2000	BAIN.2000	BAIN.3000 (chan 3/4)
APx585	BAOU.0000	BAIN.0000	n/a
APx586	BAOU.0000	BAIN.0000	BAIN.1600 (chan 9-16)

Audio Precision recommends conducting a performance check to verify proper operation before opening up the instrument.

Analog Panel Replacement:

Verification

1. Determine if the instrument's analog input and output panels should be replaced as follows:
    a. Check the date of manufacture on the rear panel label. If the date is December 2008 or later, stop here. The instrument already has the new panels.
    b. If the label is not legible, Go to Help|About in the APx500 software. Scroll down and check the date of manufacture of the Analog Input and Analog Output modules. If the date is December 2008 or later, stop here. The instrument already has the new panels.
    c. If "SAB-13" is written on the rear panel label, then stop here. The instrument already has the new panels.
2. Remove the top cover of the instrument and inspect the capacitors on the back of the analog input and output panels. If the instrument has 4 or 16 analog input channels, also remove the bottom cover to inspect the second analog input panel. Refer to Figure 1.
    a. If the Analog Input or Analog Output panels have through-hole axial capacitors, then the instrument already has the new panels. Write "SAB-13" on the rear label. Replace the covers and stop here.
    b. If the panels have SMT (surface mount) capacitors, continue with the replacement procedure.

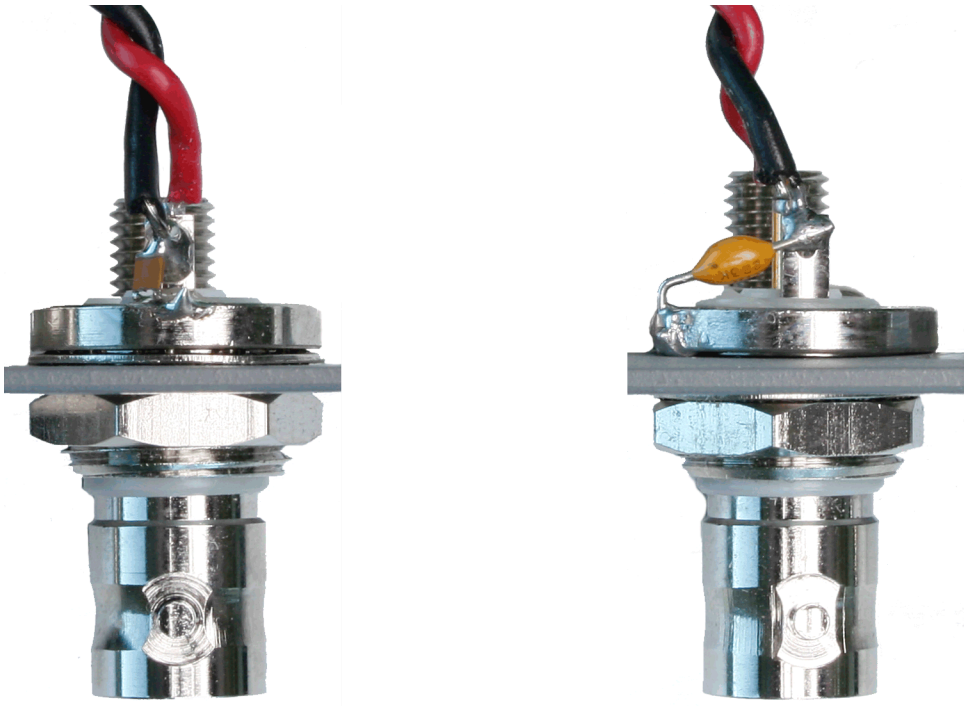

Fig 1 BNC connectors mounted on front panels. Left has old style SMT RFI suppression capacitor. Right has new style axial through-hole RFI suppression capacitor.

Repeat the following replacement procedure for each Analog Input and Output panel in the analyzer. We recommend removal and replacement of one analog panel at a time. This will help to reduce installation errors.

Replacement

3. Disconnect the black ribbon cable connector from the back side of the Analog Output or Input panel.
4. On the back side of the panel, there are red and black wires with connectors for each channel that plug into the large Analog Output or Input module circuit board behind. Unplug each one. If the plastic polarizing connector shell mounted to the large circuit board detaches with the panel connector, remove the shell and correctly re-install it.
5. Remove the gray painted 4-40 screws that secure the panel to the front of the instrument. Slide the panel out and away. This panel will not be used again, and will need to be returned to Audio Precision USA.
6. Remove the new panel from the antistatic bag. Straighten the red & black wire pairs so that they will pass easily through the opening in the front of the instrument.
7. Use the gray painted 4-40 screws that were previously removed to secure the new panel.
8. Plug the red and black wire connectors into their correct locations on the Analog Input or Output modules. Note that the positioning of the red and black wires in important in order to not compromise crosstalk. Refer to Figures 2-5 below.

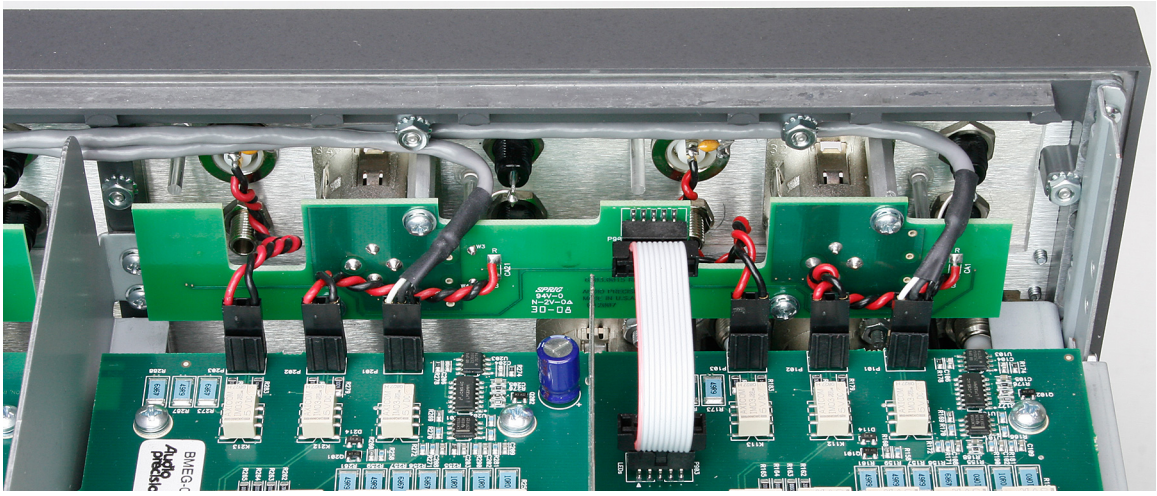

Fig 2 APx52x Analog Output panel and module.

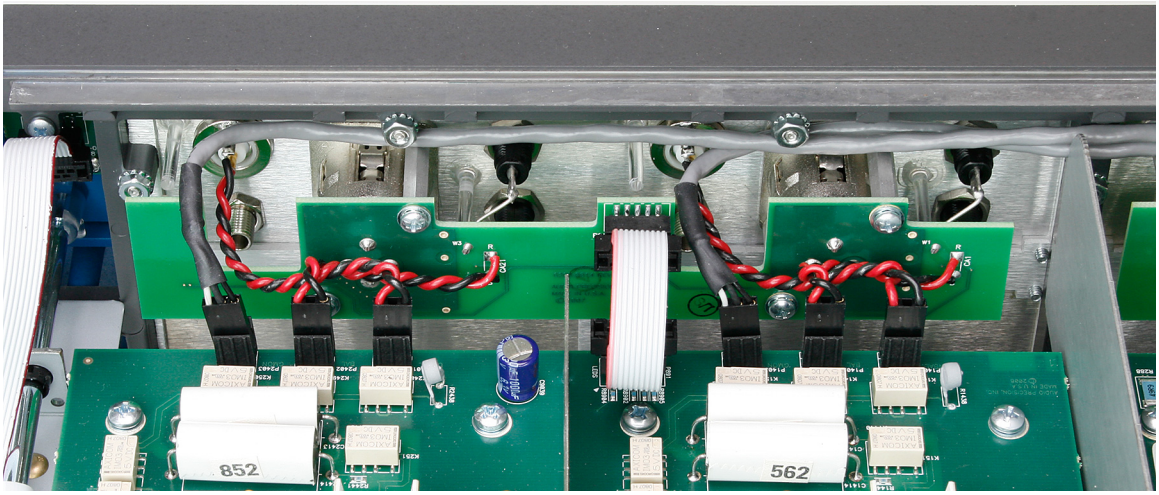

Fig 3 APx52x Analog Input panel and module.

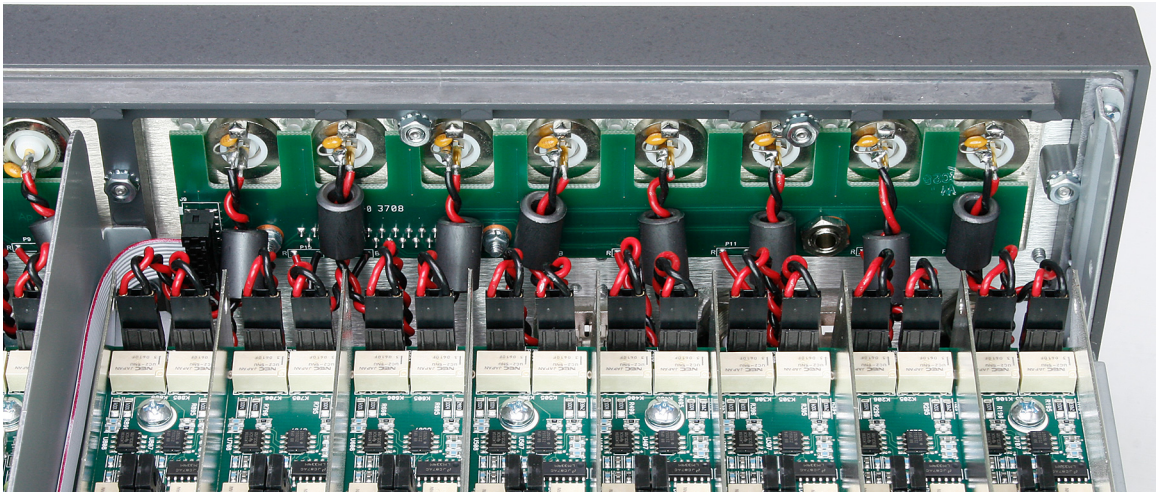

Fig 4 APx585/586 Analog Output panel and module.

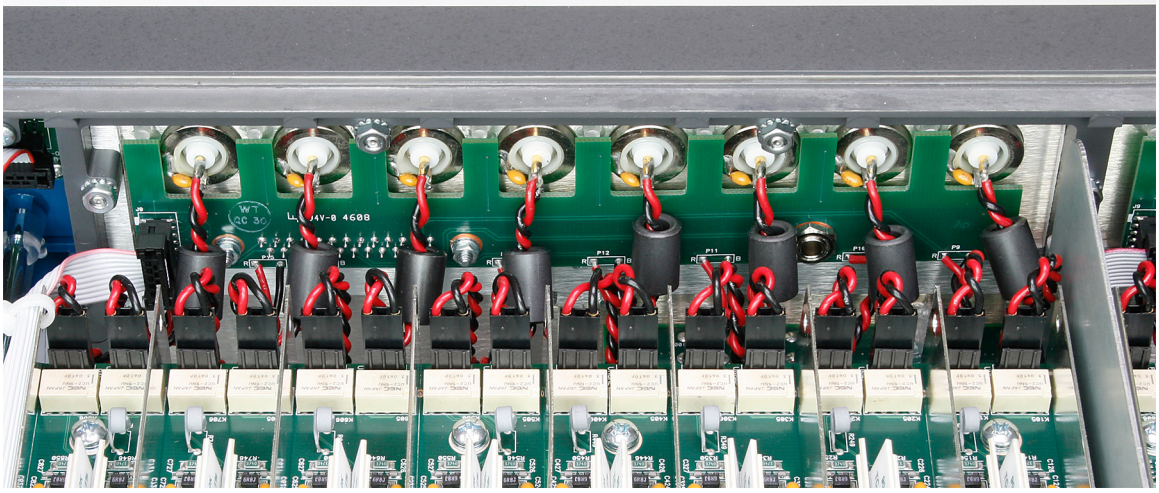

Fig 5 APx585/586 Analog Input panel and module.

Completion

9. Power on the instrument and run the APx Performance Checks. If the Performance Checks fail, recheck the installation of the red and black wire connectors to the Analog modules. If the test failures persist, contact Jim Duncan at Audio Precision.
10. If the Performance Check tests all pass, reinstall the top and bottom (if removed) covers. Write “SAB-13” on the back panel label.
11. Send the old Analog Input and Output panels that were removed to Audio Precision USA.
12. Opening the case voids calibration. If the customer requires calibration, the instrument should be re-calibrated at this time.

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IX0930153800

Service Advisory Bulletin APX.0014
Output Protection Threshold Level and Circuit Modification

Date: August 2009

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Subject: Modifications to increase the maximum threshold level and reduce the switching response time of the threshold level generator circuit.

Applies To: APx models 520, 521, 525, and 526 with BMEG module revision 004 or earlier.

Summary:

The AG52 option increases the maximum analog output level that the generator is capable of producing. To accommodate the AG52, the output protection circuit on the BMEG Analog Output module must be modified to increase the high-range protection threshold level to prevent false triggering on high output level signals. In addition, this Service Advisory Bulletin includes another modification to improve the response time when switching between the high and low threshold levels. The circuit changes in this document are also included as part of the AG52 Upgrade Kit Instructions (AP doc 8211.0275). Audio Precision recommends implementing these modifications to all affected APx52x Series instruments that are returned for calibration, adjustment, or repair, regardless of whether the AG52 is being installed.

Table 1 Affected instruments

BMEG Revision	Status	Implement SAB-14
005 or higher*	Any	No
004 or lower*	AG52 installed	No
	SAB-14 marked on rear label	No
	Neither AG52 nor SAB-14 on label	Yes

* To determine the BMEG Analog Output module revision, read the label on the module, or go to Help|About in the APx500 Measurement Software.

Tools and Required Materials:

- #1 Phillips screwdriver.
- Static-protection wrist strap or other grounding device.
- Male XLR to female XLR cable 1m (quan 2).
- Male XLR to female XLR digital 110 Ohm cable (APx525/526 only, quan 1).
- Male BNC to male BNC (50 or 75 Ω) cable 1m (APx520/521, quan 2; APx525/526, quan 3).
- Toslink optical digital cable (APx525/526 only, quan 1).

- BNC to Banana cable, or BNC to BNC cable with BNC to banana adapter.

Parts List:

Part Number	Description	Quan
1176.1432.1	Resistor, 14.3k SMT	2
1176.3241.1	Resistor, 3.24k 1% SMT	2

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

Protection Circuit Modification:

Preparation

It is recommended to conduct both a performance check and a calibration of the APx instrument before performing this modification.

The performance check will verify correct operation of the instrument. The appropriate performance check project for the instrument may be obtained from the APx Resources disc or the AP website.

The calibration will document the pre-upgrade condition of the APx instrument and ensure that it conforms to AP factory specifications. Please refer to your company's ISO-9000 or ISO-17025 documents for calibration requirements.

Important: Opening the instrument to perform this modification will invalidate its current calibration. Therefore, calibration is recommended after the upgrade to re-certify the instrument.

Modification

1. Use a #1 Phillips screwdriver to remove the ten 4-40 gray painted screws that secure the instrument top cover. Save these screws for re-installing the top cover later.
2. In the front left corner of the BMEG module, locate R175 and change it from 19.3k to 14.3k (AP p/n 1176.1432.1). Do the same for channel 2 (R277). See Figure 1.
3. Beside the resistor that was just changed, locate Q102. Solder new resistor R199 3.24k 1% (AP p/n 1176.3241.1) across the emitter and base as shown in Figure 1. Do the same for channel 2, soldering a new resistor R299 across Q202.

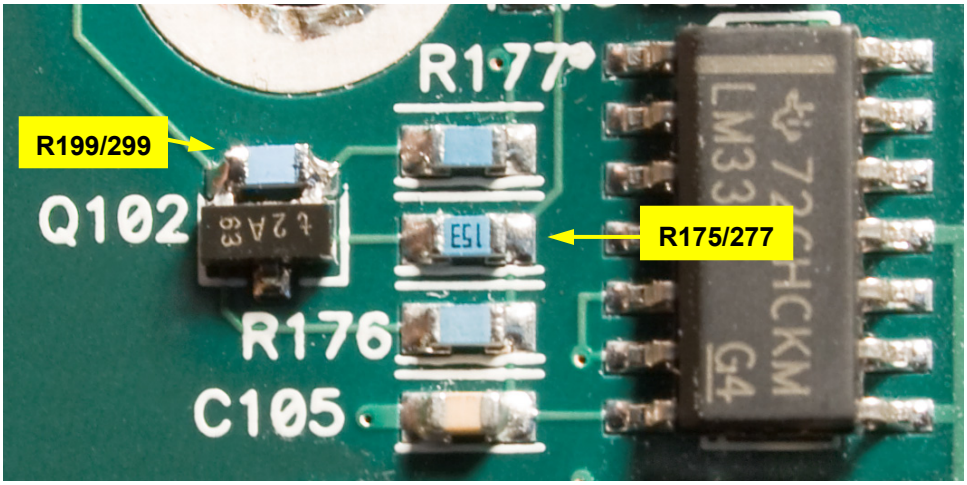

Fig 1 BMEG module modifications.

Verification

6. Power on the instrument and start APx500 Measurement Software version 2.4 or higher.
7. Open a new project, and set the signal path Output Configuration to Analog Unbalanced and the Input Configuration to Loopback.
8. Set the generator frequency to 300 Hz and the level to 1 Vrms. Turn on the generator.
9. Place a multimeter between ground and U101 pin 1 and check for -90 to -95 mVDC. Do the same at U201 pin 1 for the other channel.
10. Increase the generator level to 2 Vrms. Now check for -440 mVDC to -460 mVDC at the same points.
11. Download the APx Series Performance Checks from ap.com and run PerfCheck.exe to check the entire instrument.
12. If the performance checks pass, replace the top and bottom covers.
13. If the voltage checks in steps 9 and 10 fail, or the performance checks in step 11 fail, please contact Jim Duncan at Audio Precision (jimd@ap.com) to obtain factory service.
14. Re-calibrate the instrument if required.

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Service Advisory Bulletin APX.0015
Failure of Software to Recognize Instrument (BZOD Firmware Upgrade)

Date: September 2009

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: All APx instruments manufactured before August 2009.

Action: Audio Precision requires that the BZOD firmware be upgraded on all instruments that are returned for service.

Summary:

On rare occasions, an instrument may fail to be recognized when the APx500 Measurement Software is started. In the majority of these rare instances, the APx instrument will be recognized after simply closing and restarting the software. In other instances, powering off the APx instrument for a brief period, then powering it on and restarting the APx control software, will allow it to be recognized. Improvements have been made to the BZOD (CPU/USB) module firmware to correct this rare start up condition. Audio Precision requires that the BZOD firmware be upgraded on all instruments that are returned for service.

Tools and Required Materials:

- APx Measurement Software version 2.4 or later.
- Desktop PC with USB 2.0 port and battery backup (UPS), or notebook PC with 30 minutes minimum battery run time.
- Battery backup (UPS) for the APx instrument.
- Spare BZOD module.

Important: If the firmware upgrade procedure is interrupted, the instrument may be rendered inoperative until the BZOD module is replaced. Therefore, do not attempt the upgrade unless battery backup and a spare BZOD module is available.

Firmware Upgrade:

Eligibility Check

All instruments manufactured before August 2009 should be upgraded. To determine the date of manufacture, read the label on the rear panel, or go to Help|About in the APx500 Measurement Software and read the manufacturing date for the BRIO Main Interconnect module.

If you are unsure if the BZOD firmware has already been upgraded, you may use the following method to determine the firmware version:

a) Power on the instrument and start the APx500 software version 2.4 or later.

b) After it fully loads, close the APx500 software and power off the instrument.

c) Disconnect the USB cable.

d) Connect a null-modem cable to the "Software Options" connector on the rear of the instrument. Connect the other end to COM 1 on the PC.

e) Start HyperTerminal or an equivalent terminal emulation program on the PC. Set it to 8/N/1, 115,200 baud, and flow control off.

f) Power on the instrument.

g) HyperTerminal will display a series of text messages, including the boot version, as follows:

```
Boot 0 version is: 5
```

h) If the version is 5 or below, the firmware upgrade is needed. If the version is 7 or above, the instrument already has upgraded firmware and you may stop at this point.

i) Power off the instrument, remove the null-modem cable, and reconnect the USB cable.

If you are unable to determine the BZOD firmware version, you may proceed to perform the upgrade. Although unnecessary, it will not harm the instrument if the upgrade is performed twice.

Upgrade

1) Run the APx Performance Checks to proper operation.
2) Connect the APx instrument to a backup power supply (UPS). Also connect the PC to the backup power supply, or use a notebook computer with at least 30 minutes battery run time.
3) Modify the APx500 desktop icon as follows:
   a) Right click on the icon and choose Properties.
   b) Select the Shortcut tab and change the target from:

   ```
   "C:\Program Files\Audio Precision\APx500 2.4\AudioPrecision.APx500.exe"
   ```

   to

   ```
   "C:\Program Files\Audio Precision\APx500 2.4\AudioPrecision.APx500.exe"/upgradeboot0
   ```

   (your path and APx version may vary from the example)
4) Power on the instrument and double click the shortcut to start the APx500 Measurement Software.
5) The software will open and display a prompt asking "Do you wish to upgrade the firmware?" Click *yes*. While the upgrade is in process, the message "Upgrading instrument firmware" will be displayed.

Important: Do not interrupt power to the PC or APx instrument during the upgrade. Doing so may render the instrument inoperative until the BZOD module is replaced.

6) After the firmware upgrade has completed, close the APx500 Measurement Software.
7) Modify the APx500 desktop icon as follows to remove the change made in Step 3 above:
   a) Right click on the icon and choose Properties.
   b) Select the Shortcut tab and change the target from:

   ```
   "C:\Program Files\Audio Precision\APx500 2.4\AudioPrecision.APx500.exe"/upgradeboot0
   ```

   to

   ```
   "C:\Program Files\Audio Precision\APx500 2.4\AudioPrecision.APx500.exe"
   ```

   (your path and APx version may vary from the example)
8) Restart the APx500 Measurement Software and run the APx Performance Checks to verify proper operation.

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IX0930153900

Service Advisory Bulletin APX-0016
Analog Input Failure Channels 9–16
(Cover replacement)

Date: March 9, 2010

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: APx586 serial numbers APX6-61025 – APX6-61027, APX6-62026 – APX6-62031.

Action: Audio Precision requires that the covers be replaced on all affected instruments. See also service advisory bulletin APX-0017.

Summary:

When 12–15 VDC is applied to the channel 9–16 analog inputs, certain components may fail after a prolonged period of time due to overheating. The analog inputs on APx586 instruments are DC coupled, and therefore do not block DC voltages on a DUT's outputs from entering the instrument. To improve ventilation and reduce internal temperatures, the covers on early APx586 instruments must be replaced.

Replacement of the components that may fail is addressed in SAB APX-0017. If both advisories apply to an instrument, the cover swap described in this advisory may be done while completing APX-0017.

All APx586 instruments manufactured before February 2010 should be checked to determine if SAB APX-0016 and/or APX-0017 applies.

Tools and Required Materials:

- #1 Phillips screwdriver.

Parts List:

Part Number	Description	Quan
7150.0300	Top cover	1
7110.0300	Bottom cover	1
5630.0001	Foot, Black .5 x .5 x .25	4

Cover Replacement:

1. Observe the location of the ventilation holes in the top cover and then identify it in Figure 1 below. If the instrument has the original cover, replace it with the improved one. Then, re-attach the carrying handle, and affix the four new feet to the side as shown.

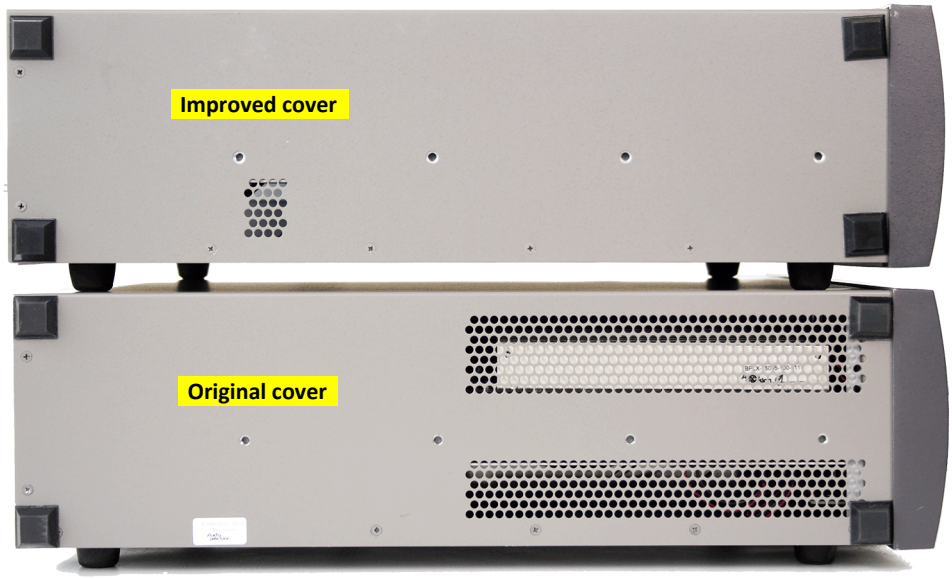


Figure 1 APx586 original (bottom) and improved (top) covers.

2. Observe the location of the ventilation holes in the bottom cover and then identify it in Figure 2 below. If the instrument has the original cover, replace it with the improved one.

Figure 2 APx586 original (left) and improved (right) covers

3. Re-calibrate the instrument if required.

Service Advisory Bulletin APX-0017
Analog Input Failure Channels 9–16
(Module replacement)

Date: March 9, 2010

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: APx586 instruments with BCAS module revisions 106–111 or 200–202.

Action: Audio Precision requires that the BCAS modules be replaced in all affected instruments.

Summary:

When 12–15 VDC is applied to the channel 9–16 analog inputs, certain components may fail after a prolonged period of time due to overheating. The analog inputs on APx586 instruments are DC coupled, and therefore do not block DC voltages on a DUT's outputs from entering the instrument. This advisory gives instructions to replace both BCAS modules on the affected instruments.

Some APx586 instruments also have covers that do not allow adequate ventilation. This is addressed in SAB APX-0016. If both advisories apply to an instrument, the cover swap described in APX-0016 may be done while completing this advisory.

All APx586 instruments manufactured before February 2010 should be checked to determine if SAB APX-0016 and/or APX-0017 applies.

Tools and Required Materials:

- #1 and #2 Phillips screwdrivers.
- Static-protection wrist strap or other grounding device.

Parts List:

Part Number	Description	Quan
BCAS.0000	Analog input module (8 channel)	2

Analog Input Module Replacement:

Verification

1. Determine if the instrument's analog input modules should be replaced as follows:

   Go to Help|About in the APx500 software (Figure 1). Scroll down to *8-Channel Analog Input Module* in the Product Components select box. In the Component Details box, read the ID value. It will start with BCAS and end with the revision number. If the revision is 106–111 or 200–202, then the upper BCAS module must be replaced. Now, scroll down to the second *8-Channel Analog Input Module* entry (channels 9–16) and read the revision number. If the revision is 106–111 or 200–202, then the lower BCAS module must be replaced.

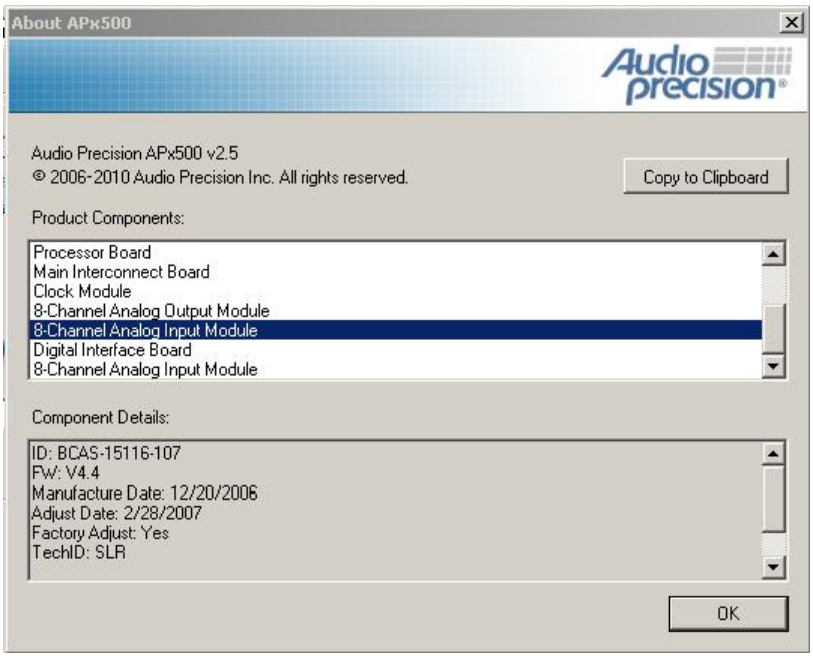


Figure 1 APx500 Help|About box.

2. To obtain replacement BCAS modules, contact Jim Duncan (jimd@ap.com) at Audio Precision. After receiving the replacements, proceed with the next step below.

Replacement

3. Remove the top and bottom covers. Facing the instrument from the front, the BCAS module for channels 1–8 is the large circuit board on the right side. The BCAS module for channels 9-16 is located underneath it.
4. Unplug the 16 red and black twisted pair cables shown in Figure 2.

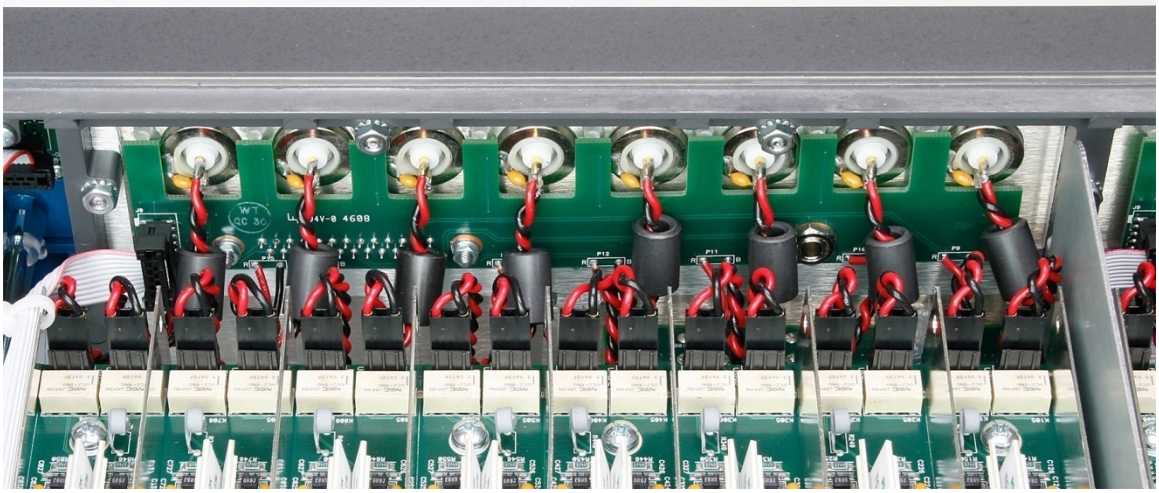


Figure 2 BCAS Analog Input module for channels 1–8.

5. Unplug the ribbon cable from the rear of the board, as shown in Figure 3.

6. Referring to Figure 3, use a #2 Phillips screwdriver to remove the eight screws that secure the BCAS module (shown in yellow). Lift the module to disconnect it underneath by inserting an IC puller into the holes near the rear (shown in red).

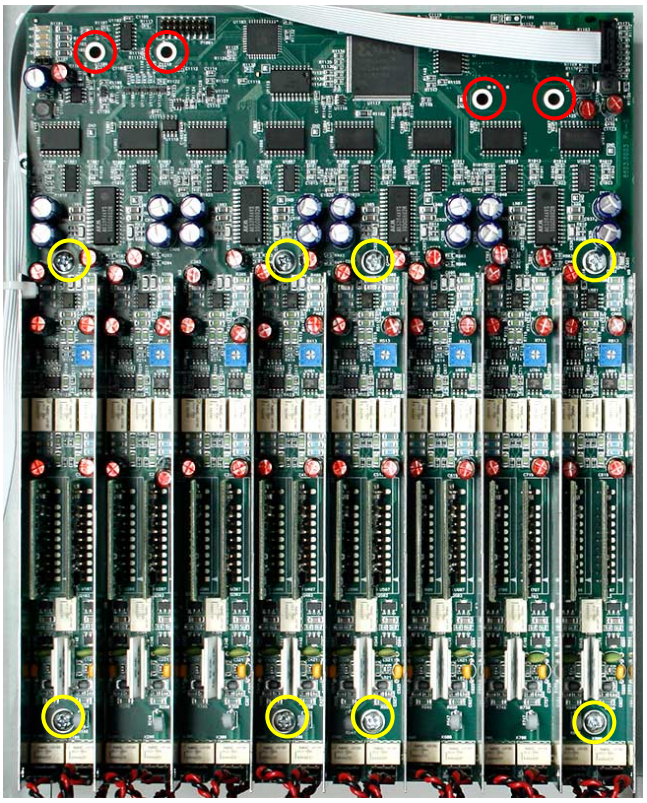


Figure 3 BCAS mounting screws (yellow) and removal holes (red).

7. Remove the module from the instrument, and place it in an anti-static bag.
8. Take a new BCAS module from its anti-static bag and place it in the instrument, lining up the mounting holes with the threaded standoffs below.
9. Press the module down firmly so that the connectors underneath mate fully. Confirm that the BCAS module is firmly attached by gently trying to lift the board near the rear edge. When correctly attached, the board will stay seated (Figure 4).

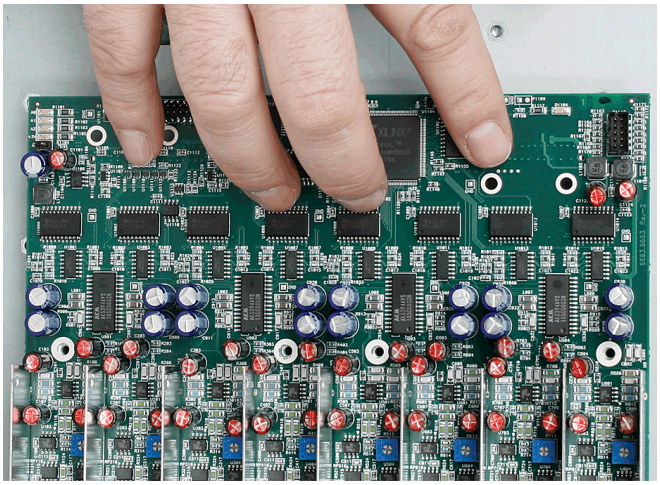


Figure 4 Seating the rear section of the BCAS module.

10. Replace the eight screws that secure the module.
11. Reattach the ribbon cable.
12. Connect the input wires between the Analog Input Panel module and the BCAS module. Facing the front of the instrument, start at the left and plug in the BNC wires for channel 1 (the wire pair with a ferrite core). Then plug in the Balanced wires for channel 1 (the wire pair without a ferrite core). Now, continue to do the same for the remaining channels. Note that the connectors are keyed to fit one direction—the black wire will be on the left, and the red wire on the right.
13. To replace the BCAS module on the bottom (channels 9–16), turn the instrument over and repeat steps 4–12.

    Note: It is not necessary to make any adjustments on the BCAS modules.

Operation Checks

14. Attach the AC power cord and the USB cable. Turn on the instrument, and start the APx500 software.
15. Run the APx Performance Check. The Performance Check is located on the APx Resources Disc, and may also be downloaded from the AP.com website (http://www.ap.com/display/file/258). Note that the version numbers of APx500 and the APx Performance Check must match.
16. If the Performance Check does not pass, contact Jim Duncan at Audio Precision (jimd@ap.com).
17. Replace the top and bottom covers.

    Note: Verify if the instrument is covered by SAB APx-0016. If so, install the new covers at this time.
18. The old BCAS modules must be returned to the Audio Precision factory. The RMA number that was provided with the replacement modules is required to be written on the package to identify it.
19. Re-calibrate the instrument if required.

Service Advisory Bulletin APX-0018
HDMI 192 kHz Measurement Errors

Date: March 9, 2010

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: APx585 with HDMI, serial numbers 10535–10583 and 12636–12688.

Action: Audio Precision requires replacement of HDMI modules that are verified defective by the attached test. About 10% of the instruments in the listed serial number ranges have defective modules.

Summary:

Due to an error by a supplier, some HDMI modules were manufactured with incorrect data line termination resistors. This can cause reflections that result in measurement errors at the 192 kHz sample rate. Measurements made at lower sample rates are not affected.

Defective HDMI modules can be identified by running the attached project file. This bulletin describes how to run the test, and how to replace HDMI modules that test as defective.

Tools and Required Materials:

- HDMI cable.
- #1 and #2 Phillips screwdrivers.
- Static-protection wrist strap or other grounding device.

Parts List:

Part Number	Description	Quan
BHDM.0000	HDMI module	1

HDMI Module Test and Replacement (if necessary):

Verification

1. Open the included APx HDMI Test project (APx585_HDMI_Loopback_Test.approj) or download it from the AP website (http://ap.com/download/splash/461).
2. Connect an HDMI cable between HDMI Source and HDMI Sink on the APx instrument.
3. In APx500, select Project > Start Sequence or click the Start Sequence button.
4. At the conclusion of the sequence, a report will display showing “Pass” or “Fail”.
5. If all tests pass, the HDMI module is not defective—no further action is required. If any test fails, contact Jim Duncan (jimd@ap.com) at Audio Precision to obtain a new HDMI module, and then proceed with the replacement steps below.

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Important: Disconnect all power cables and external cable assemblies from the instrument before starting the hardware removal or installation procedures.

Replacement

6. Remove both the top and bottom covers of the APx instrument. Turn the instrument upside down.
7. Remove the four screws that secure the HDMI front panel to the instrument, as shown in Figure 1.

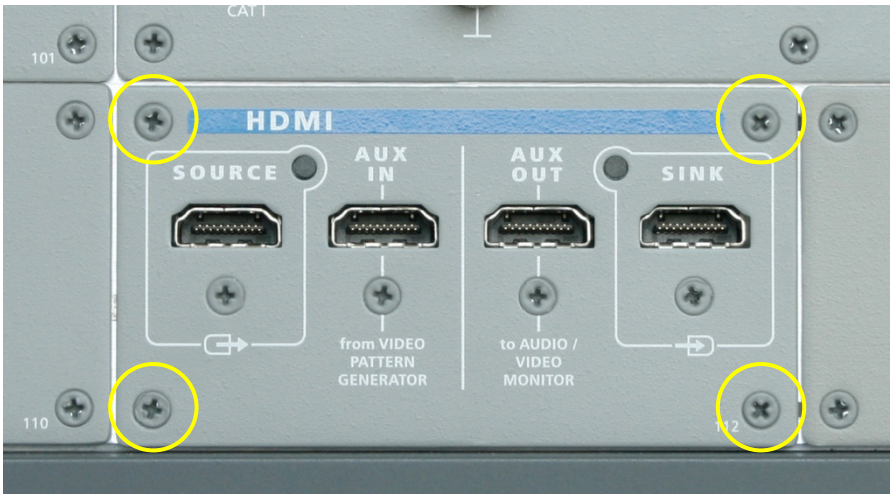


Figure 1 Front panel screws

8. Remove the four screws that secure the HDMI circuit board (BVID), as shown in Figure 2.

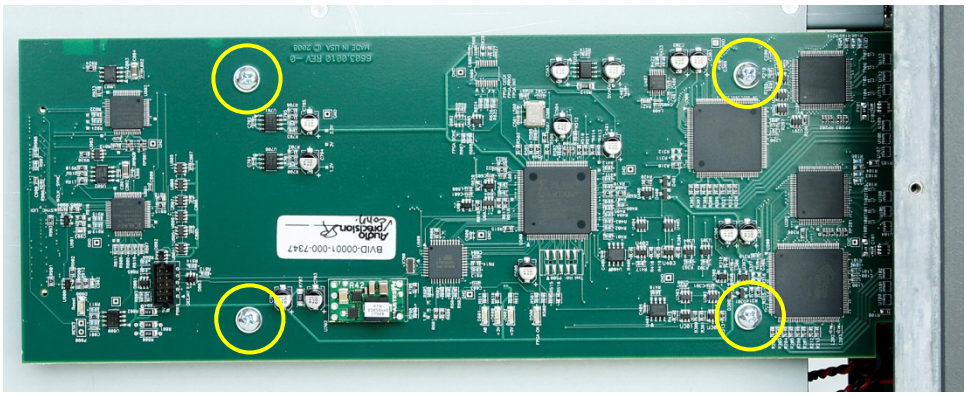


Figure 2 BVID circuit board screws

9. Gently lift the end of the BVID board to unplug it from the connector, as shown in Figure 3.

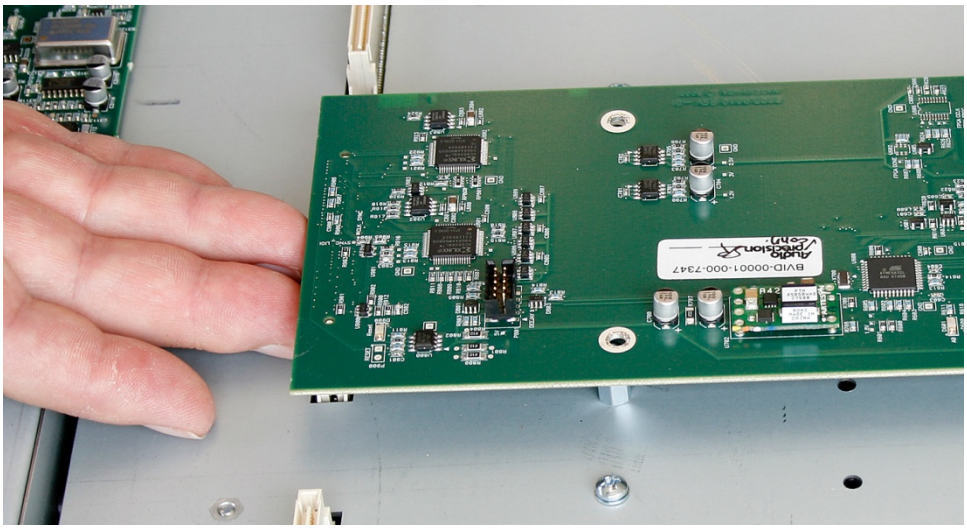


Figure 3 Unplugging the BVID board

10. Slide the old HDMI module out the front of the instrument. Note that it will be necessary to tilt it, as shown in Figure 4, to clear the front panel.

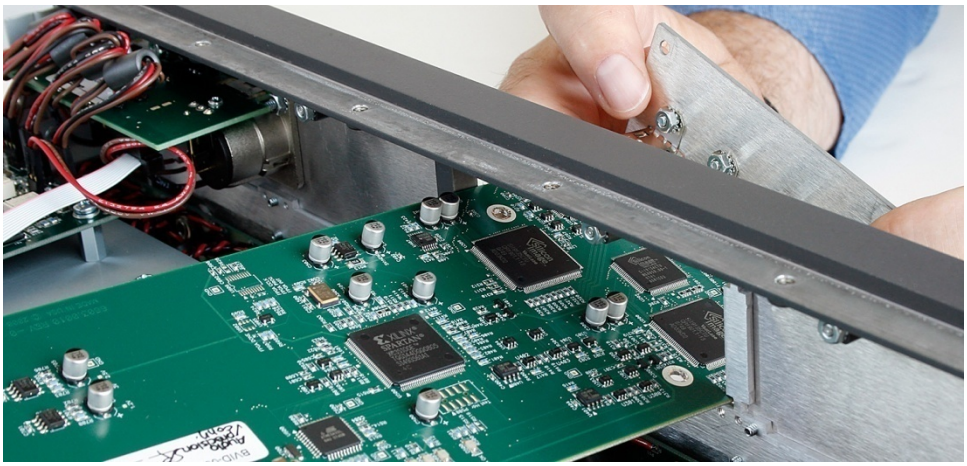


Figure 4 Removing the old HDMI module

11. Insert the new HDMI module through the front panel, tilting it as shown in Figure 4. Push the end of the card into the connector, and replace the four circuit board screws and the four front panel screws.

Operation Checks

12. Turn the instrument over so it is right side up.
13. Attach the AC mains cord and power on the instrument.

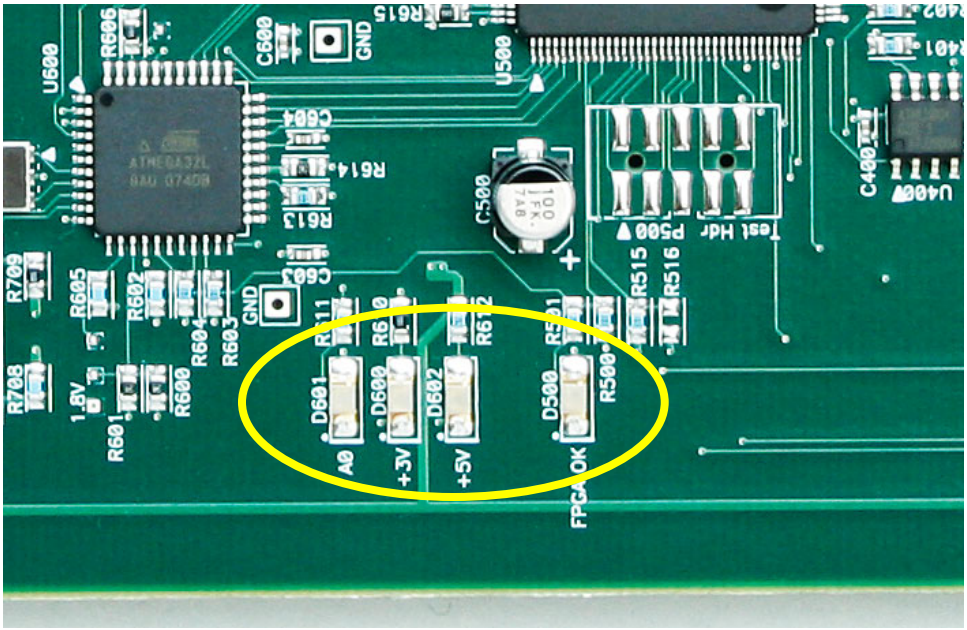


Figure 5 BVID LED indicators A0, +3V, +5V, and FPGA OK.

14. Wait at least one minute, and then observe that the state of the LEDs on the BVID circuit board (Figure 5) is as follows:

    A0 = BLINKING SLOWLY
    +3V = ON
    +5V = ON
    FPGA OK = OFF

    If the LED state is not correct, make sure that the connector under the BVID board is fully inserted into the mating connector on the BRIO module. If necessary, contact Audio Precision technical support for assistance.

15. Repeat steps 1–5 to verify correct operation of the new HDMI module.
16. Run the APx Performance Check to verify correct operation of the instrument.
17. The old HDMI module must be returned to the Audio Precision factory. The RMA number that was provided with the replacement module is required to be written on the package to identify it.
18. Re-calibrate the instrument if required.

Service Advisory Bulletin APX-0019
Failure of Digital I/O LED Indicators

Date: July 13, 2010

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: All APx525, 526, 585, and 586 instruments manufactured before June 2010.

Action: Install this modification on all APx instruments returned for adjustment or repair.

Summary:

The input connector LED indicators on the AES Digital I/O panel may fail due to a detached ribbon cable. The cable may detach due to rough shipment, or if the instrument is dropped. This bulletin describes a modification to secure the cable to prevent this from occurring.

Tools and Required Materials:

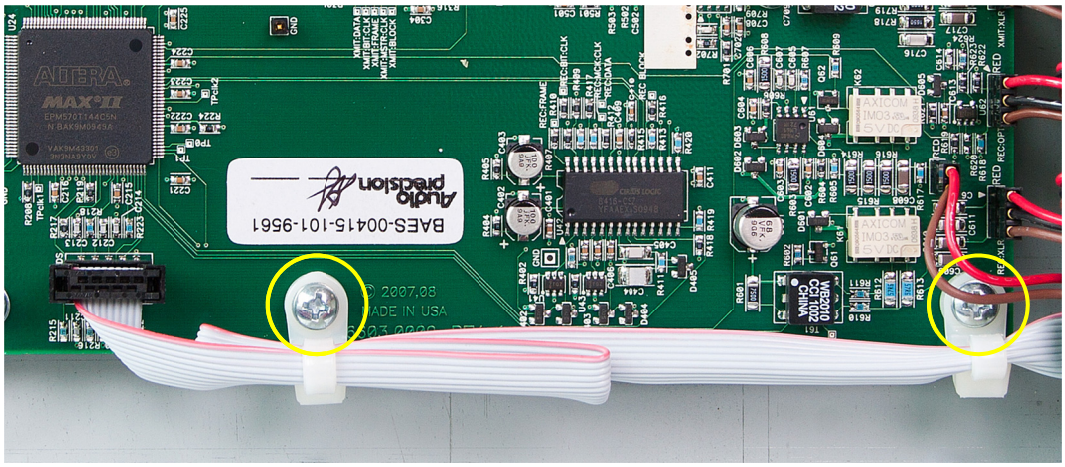
- Wire cutter.
- #1 and #2 Phillips screwdrivers.
- Static-protection wrist strap or other grounding device.

Parts List:

Part Number	Description	Quan
5611.0005	Screw-mount cable ties	2
5113.7112	Screw, Sem 6-32 x 3/8" Phillips	2

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Digital I/O Cable Tie Installation



Adding new cable ties to the BAES module.

1. Turn on the instrument and start the APx500 software. In Signal Path Setup, switch both the output and input connectors through the choices of Digital Unbalanced, Digital Balanced, and Digital Optical. Observe whether the front panel LEDs on the Digital I/O module correctly illuminate to indicate the connector in use. Turn off the instrument and disconnect the power cord.
2. Turn the instrument over and remove the bottom cover.
3. Locate the BAES module behind the AES Digital I/O panel.
4. Make sure that both ends of the ribbon cable are fully inserted into their sockets. If they are already fully inserted, and the Digital I/O LEDs did not illuminate correctly in Step 1, then locate source of the problem before proceeding.
5. Remove and discard the two screws at the locations circled in yellow above, that hold down the module.
6. Take the two new 6-32 x 3/8" screws (AP p/n 5113.7112), insert them through the two new cable ties (AP p/n 5611.0005), and install them into the open circuit board mounting holes.
7. Fold the ribbon cable and loosely fasten the cable ties to secure it, as shown in the figure above. Be careful not to over-tighten the cable ties. Re-check that the cable connectors are still fully seated.
8. Replace the bottom cover and turn the instrument over.
9. Turn on the instrument and repeat Step 1 above to verify that the Digital I/O LEDs illuminate correctly.
10. Leave the instrument powered on for 30 minutes to warm up, and then run the APx Performance Check to verify correct operation before returning the instrument to the customer.
11. Re-calibrate the instrument if required.

Service Advisory Bulletin APX-0020
Software Option Module D-sub Failure

Date: July 27, 2010

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: All APx515 instruments manufactured before July 15, 2011.

Action: Install this modification on all APx515 instruments returned for adjustment or repair.

Summary:

When removing the Software Option module from the rear of an APx515, the body of the D-sub connector may separate from the circuit board. This bulletin describes the procedure for replacing the D-sub connector with one that will not separate.

Tools and Required Materials:

- Soldering iron.
- Desolder tool.
- 1/4" nut driver (thin-wall).

Parts List:

Part Number	Description	Quan
4225.1009.8	D-sub 9p female connector (with threaded mounting holes)	1
5152.3408	Screw, Nylon 4-40 x 1/4"	2

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Software Option Module D-sub Connector Replacement

1. Turn on the instrument and start the APx500 software.
2. Go to Help>About and look at the Product Components list. If any software options are currently installed, they will appear in the list as "iButton – Serial Number …" Note the serial number and the software options enabled by the iButton (shown in the Component Details box directly below). There may be more than one iButton listed.

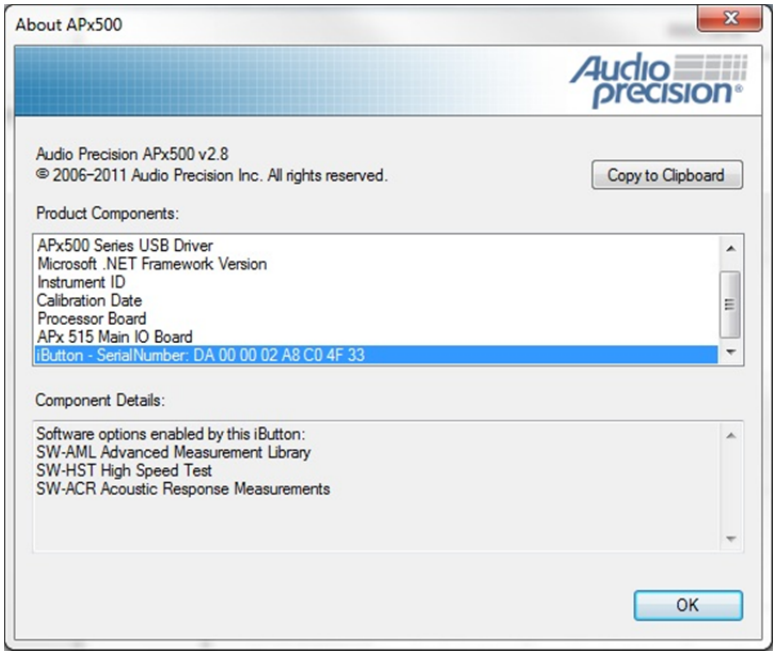


Fig 1 Help>About dialog listing iButton(s).

3. Exit the APx500 software and turn off the instrument.

Fig 2 APx515 rear panel with Software Option module.

4. On the rear panel, loosen the two thumb-screws that secure the Software Option module and detach it by pulling it straight away from the instrument.
5. Remove the three 6-32 nuts (circled in Fig 3) that secure the Software Option module circuit board (BSWO.0000) and remove it from the metal enclosure. Save the nuts for reinstallation. Note that it is not necessary to remove the iButton(s) to perform the modification.

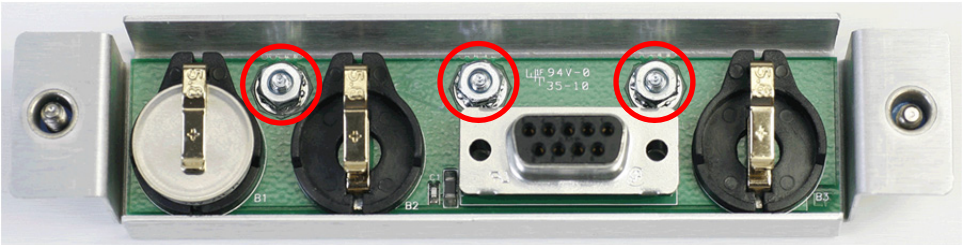


Fig 3 Software Option module (with one iButton installed).

6. On the back side of the circuit board, de-solder the 9 pins of the female 9-pin D-sub connector.

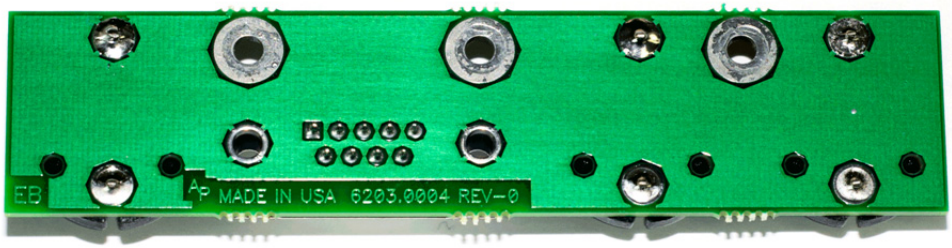


Fig 4 BSWO circuit board before modification.

7. Carefully remove the D-sub connector from the circuit board.
8. Install the new female 9-pin D-sub connector (4225.1009.8) on the board and solder the pins on the back side. Clean off all solder flux residue.
9. Install the two nylon 4-40 x 1/4" screws (5152.3408) through the back of the circuit board into the threaded holes in the new D-sub connector. Tighten but do not over-tighten the nylon screws.

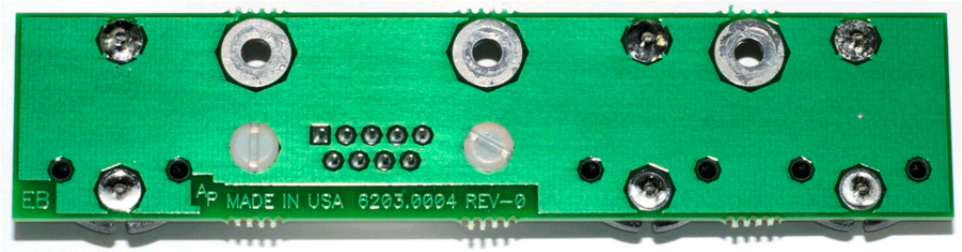


Fig 5 BSWO circuit board with new connector and nylon screws installed.

10. Reinstall the circuit board into the metal housing and secure with the three previously removed 6-32 nuts. Tighten but do not over-tighten the nuts.
11. Reattach the Software Option module to the rear of the instrument and tighten the thumbscrews.
12. Turn on the instrument and start the APx500 software.
13. Go to Help>About as described in Step 2 above and verify that the iButtons are still correctly recognized.

Service Advisory Bulletin APX.0022
Power Indicator Failure

Date: November 2011

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: APx520, 521, 525, 526, 585, and 586 manufactured before September 6, 2011.

Action: Apply to all instruments returned for adjustment or repair. Instruments received only for calibration do not need to be opened and modified.

Summary:

The ribbon cable to the front panel power indicator LED may detach during shipping. This advisory gives instructions for adding a cable tie and block to eliminate the possibility of this occurring.

Tools and Required Materials:

- #1 Phillips screw driver.
- Static-protection wrist strap or other grounding device

Parts List:

Part Number	Description	Qty
5611.0003	Cable tie	1
5611.0004	Cable tie block	1

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Cable Tie Upgrade:

1. Run the APx Self Test on the instrument to verify proper operation before opening.
2. Remove the instrument top cover and locate the back of the power switch and LED power indicator assembly.
3. Clean the adjacent instrument side rail where the tie block will be mounted with isopropyl alcohol.
4. Remove the backing paper from the cable tie block (5611.0004) and affix it to the instrument side rail as shown in Figure 1.
5. Attach the cable tie (5611.0003) around the ribbon cable as shown in Figure 1. Do not overtighten the tie. Cut off any excess.

Important: Check that the placement of the ribbon cable does not interfere with the operation of the power button slide bar.

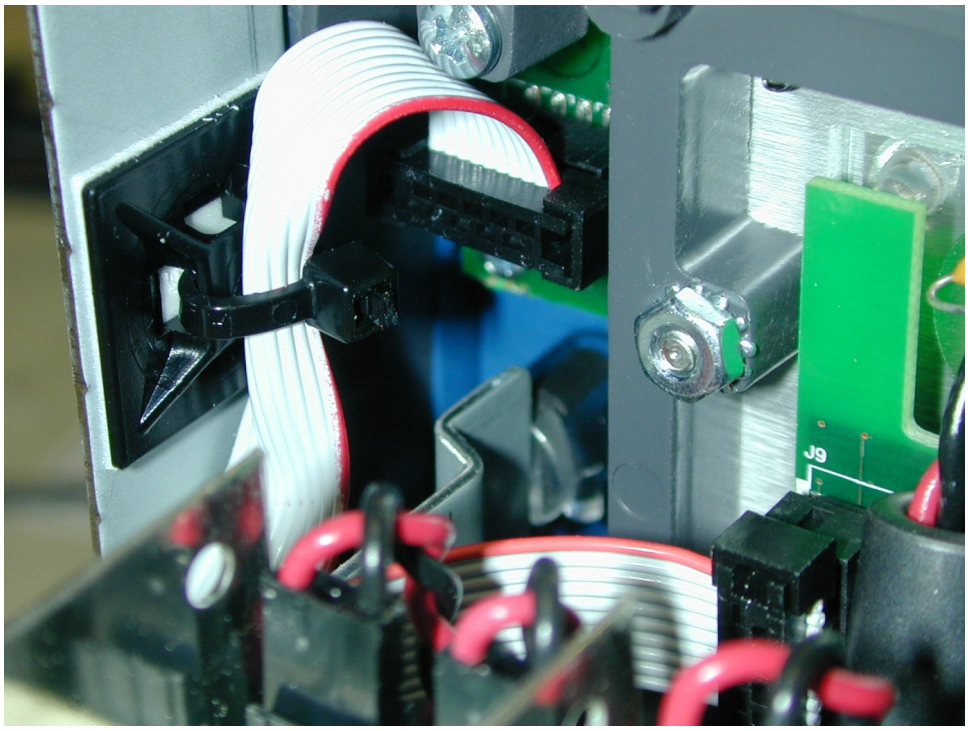


Fig 1 Power indicator LED cable secured by new cable tie and block.

6. Replace the top cover.
7. Run the APx Self Test (download at http://ap.com/display/file/534) to verify correct operation of the instrument.

Audio precision
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Beaverton, Oregon 97005
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ap.com

XI1115110400

Service Advisory Bulletin APX.0023
Nuisance Failures of APx515 Power Fuse at 230/240 VAC

Date: February 2012

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: APx515.

Action: Change Bussmann 5x20mm fuses to recommended Littelfuse type on all instruments returned for adjustment or repair. Use the recommended Littelfuse types when replacing blown fuses.

Summary:

APx515 instruments operating at 230 or 240 VAC may experience nuisance failures of the power fuses with the originally installed Bussmann brand fuses. The recommended Littelfuse replacements listed in the table below have better surge current specifications and should greatly reduce the incidence of nuisance failures.

Voltage	Qty	AP Part #	Littlefuse Part #	Description
230/240 VAC	2	4623.0315	0218.315	218 Series 5x20mm Time Lag 250 VAC 315 mA
230/240 VAC (alternate)	2		0213.315	213 Series 5x20mm Time Lag 250 VAC 315 mA
100/120 VAC	1	4620.0250	0313.600	313 Series 3AG 1¼"x¼ Time Lag 250 VAC 600 mA

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XII0217111900

Service Advisory Bulletin APX.0024
USB Port Transient Protection

Date: December 2012

To: All AP Distributors

From: Jim Duncan, Technical Support Hardware Engineer

Applies To: All APx500 instruments manufactured before December 17, 2012.

Action: Apply to all instruments returned for adjustment or repair.

Summary:

In some circumstances, especially when an instrument is improperly grounded, ESD transients can damage the USB port. This advisory gives instructions for adding the BTHR Protection Module, which increases the ESD protection on the USB port.

Tools and Required Materials:

- #1 Phillips screw driver
- Solder iron with small tip
- Multimeter
- Static-protection wrist strap or other grounding device

Parts List:

Part Number	Description	Qty
BTHR.0000	Protection module	1

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Protection Upgrade:

1. Run the APx Self Test on the instrument to verify proper operation before opening.
2. If the instrument has a Software Option Key module on the rear panel, temporarily remove it.
3. Remove the top cover, using a #1 Phillips screwdriver to remove the 22 4-40 screws that secure it.
4. Remove the six jack screws that secure the Aux Control Out, Aux Control In, and Software Options D-sub connectors to the rear panel.

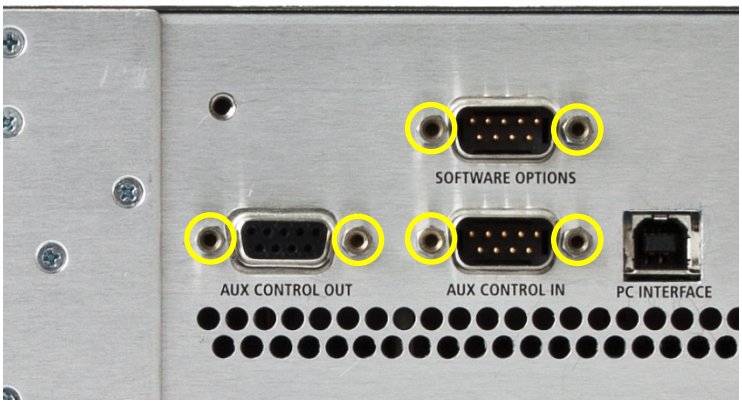

Fig 1 APx500 instrument rear panel, jack screws.

5. Remove the five screws that secure the BZOD module.

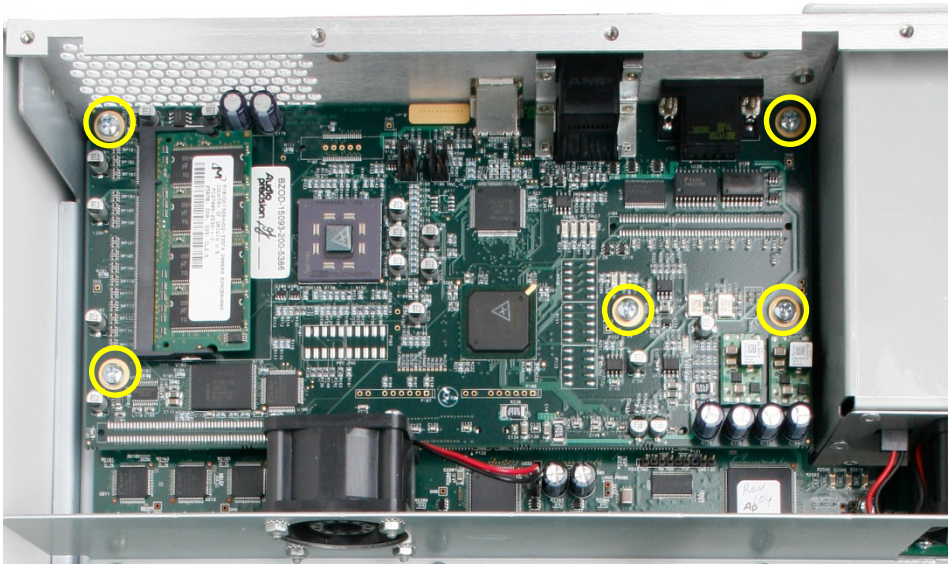

Fig 2 BZOD module retaining screws.

6. Lift up the BZOD module to disconnect it from the connector underneath. Pull back on the fan slightly so that the module clears it.
7. Place the BZOD module upside down on a static protective mat.
8. Place the BTHR module in position as shown (Figure 3).

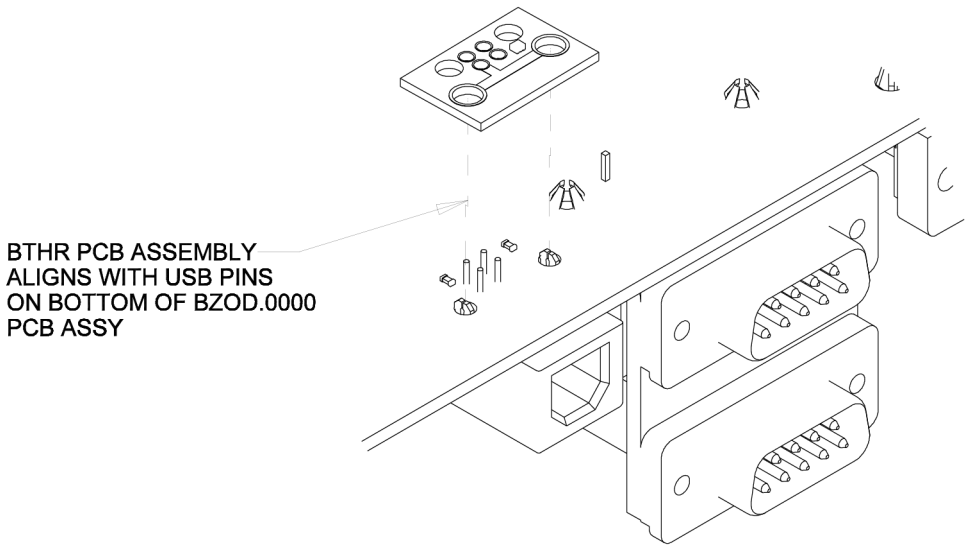

Fig 3 Placement of BTHR module.

9. Solder the BTHR module as shown (Figure 4). Solder the two mounting tabs first, and then the four USB socket pins. Use a small tipped soldering pencil and make contact with both the pin and the plated hole to prevent a cold solder joint (Figure 5). Use caution not to bridge any of the traces.

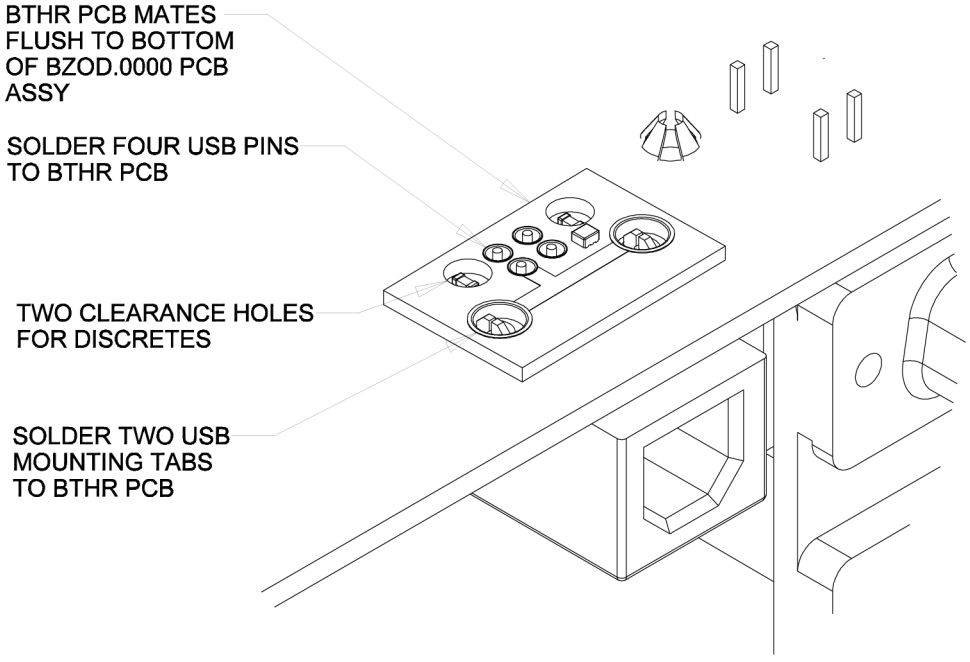

Fig 4 Soldering of BTHR module to BZOD PCB assy.

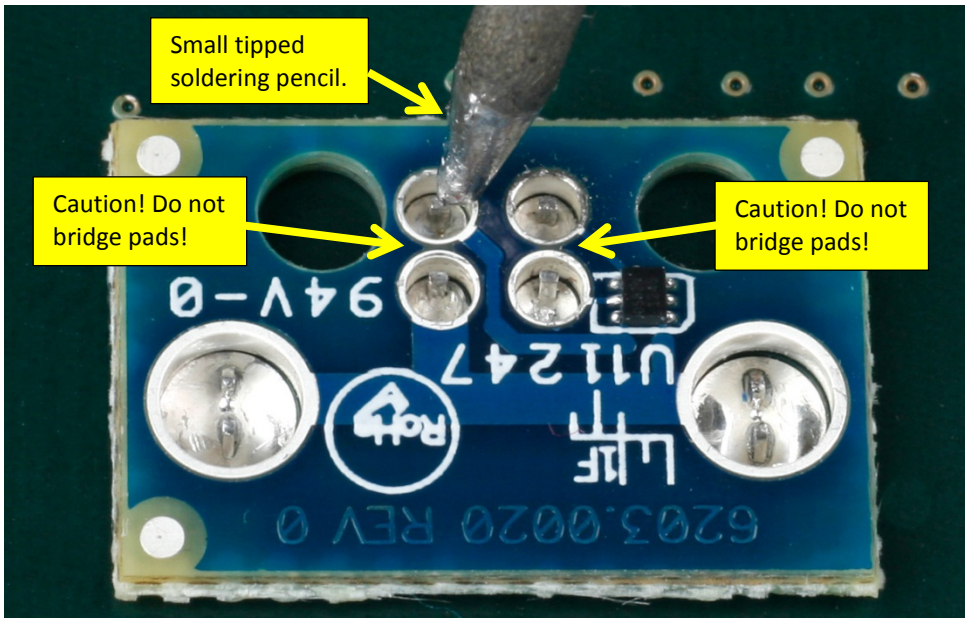

Fig 5 BTHR module soldering.

10. Using a multimeter, check that there is continuity between the two large plated holes on the BTHR and the USB jack shield on the BZOD module. Then check that there is no continuity between any of the four small plated holes on the BTHR.
11. Clean all traces of solder flux from the board.
12. Reinstall the BZOD module. Making sure that the connector underneath is lined up, and that the holes in the standoffs are centered under the holes in the module.
13. Secure the module with the five 6-32 x .25" screws that were removed earlier.
14. Secure the Aux Control Out, Aux Control In, and Software Options D-sub connectors to the rear panel using the six jack screws that were removed earlier.
15. Replace the Software Option Key module on the rear panel if it was removed.

Post-upgrade Tests

16. Reconnect the power cord. Turn on the APx instrument, and check the LED indicators in the top right corner of the BRIO module, between the power supply module (C) and the support frame (D) (Figure 6). The LED at point “A” should be blinking (active clock), and the LED at point “B” should be constantly lit (+5 volts DC).

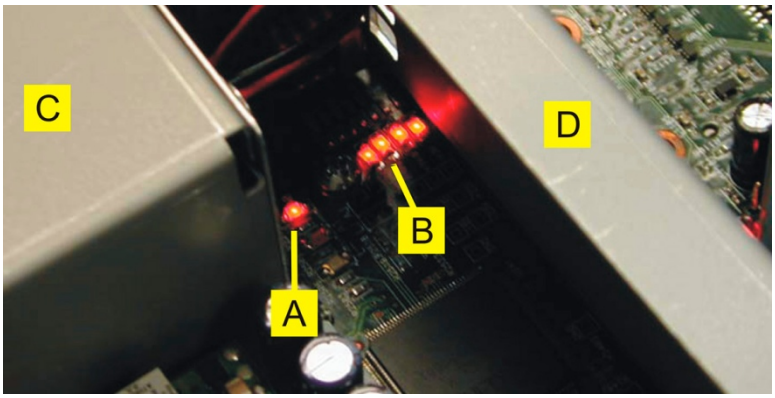

Fig 6 Power supply check.

17. If the power supply check passes, reinstall the top cover using the screws that were previously removed.
18. Download the APx Series Self Test from AP.com and run it to check the entire instrument.
19. If any check fails, verify that the BZOD module has been reinstalled correctly. If the instrument still fails the checks or otherwise does not function properly, please contact Jim Duncan at Audio Precision (jimd@ap.com) to obtain factory service.
20. Re-calibrate the instrument if required.

Service Advisory Bulletin APX.0026
4 VDC on PDM Inputs at Turn-on

Date: October 2015

To: All AP Distributors

From: John Payne, Technical Support Hardware Engineer

Applies To: All APx500 instruments with the PDM option installed.

Action: Modify PDM option revs 000 - 004 if the instrument is returned for service, or if the customer experiences damage to their device under test.

Summary:

The PDM inputs are buffered by a device operating at +4 VDC, and when the instrument is turned on it can place + 4VDC on the pins and potentially cause damage to the DUT. This modification corrects this so that the inputs are at 0 VDC when the instrument is first turned on.

Tools and Required Materials:

- #1 & #2 Phillips screwdrivers
- ¼" Hex nut driver
- Solder/desolder equipment for removal of SMT resistors
- 3/16” socket wrench
- #2 Solder Wick
- Static-protection wrist strap or other grounding device

Parts List:

Part Number	Description	Qty
1176.2001.1	2 k ohm SMT resistor	2

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Modification Procedure:

1. Run the APx Self Test on the instrument to verify proper operation before opening.
2. Remove the handle on the side of the instrument using a #2 Phillips screwdriver.

3. Using a #1 Phillips screwdriver, remove the 22 4-40 screws that secure the top cover and set it aside.
4. Turn the instrument upside down. Remove the 12 4-40 screws that secure the bottom cover and set it aside.
5. Locate the PDM module.
6. Add a 2k ohm resistor from R1062 to the pad at U112 pin 3 (U112 is not installed).
7. Add a 2k ohm resistor from R1063 to the pad at U113 pin 3 (U113 is not installed).

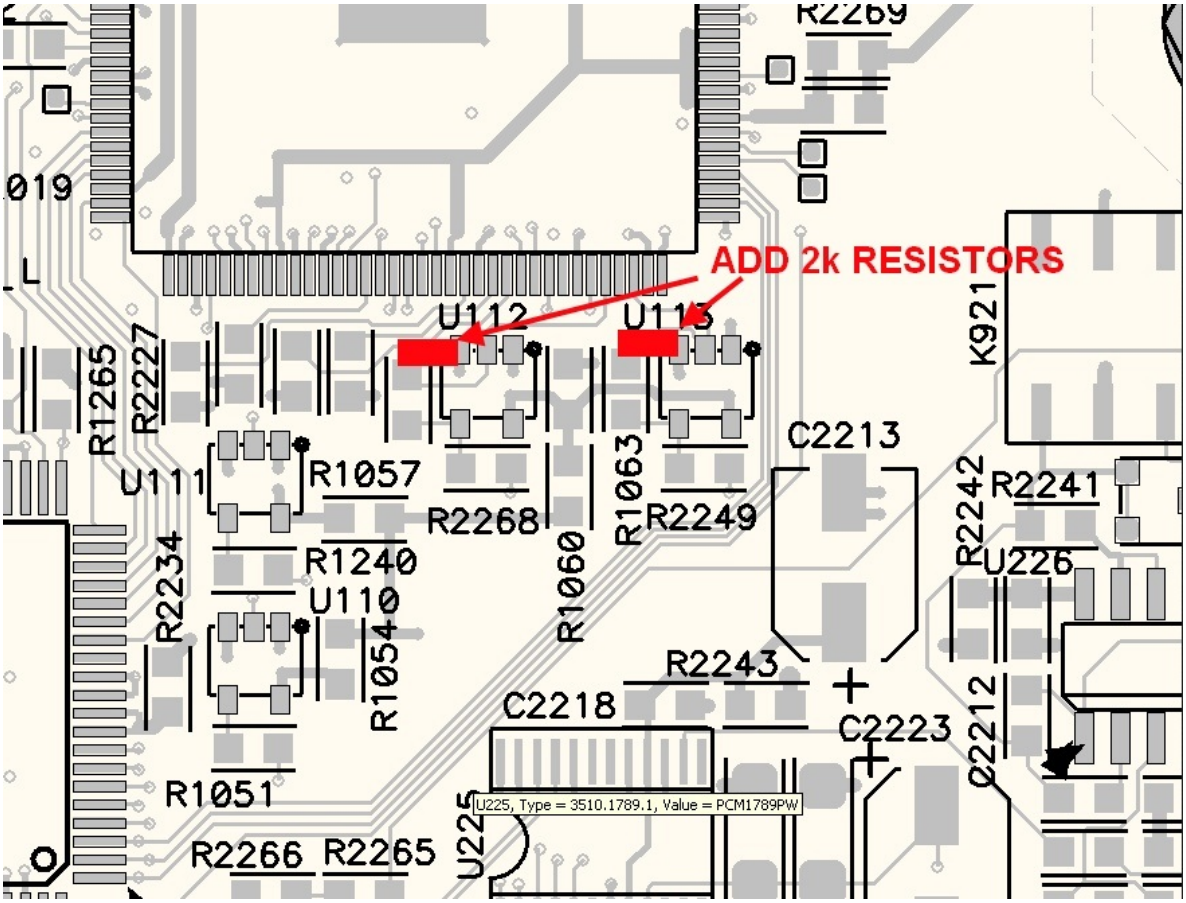

Figure 1 PDM module.

8. Clean off any solder flux residue.
9. Remove the DSIO Panel module from the instrument and set it aside in a safe place. This will be reinstalled after the modifications are complete.
10. Reinstall the top and bottom covers and the handle.
11. Download and run the APx Self Test (http://ap.com/display/file/534) to verify correct operation of the instrument.
12. If any check fails or the instrument otherwise does not function properly, please contact Hardware Technical Support at Audio Precision (service@ap.com) to obtain factory service.
13. Recalibrate the instrument if required.

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ap.com

XV1022110800

Service Advisory Bulletin APX.0027
5 VDC on DSIO Inputs at Turn-on

Date: October 2015

To: All AP Distributors

From: John Payne, Technical Support Hardware Engineer

Applies To: All APx500 instruments with the DSIO option installed.

Action: Modify DSIO option modules rev 000, 001, and 100 if the customer experiences damage to their device under test.

Summary:

The DSIO inputs are buffered by a device operating at +5 VDC, and when the instrument is turned on it can place + 5VDC on the pins and potentially cause damage to the DUT. This modification corrects this so that the inputs are at 0 VDC when the instrument is first turned on.

Tools and Required Materials:

- #1 & #2 Phillips screwdrivers
- ¼" Hex nut driver
- Solder/desolder equipment for removal of SMT resistors
- 3/16” socket wrench
- #2 Solder Wick
- Static-protection wrist strap or other grounding device

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

Modification Procedure:

1. Run the APx Self Test on the instrument to verify proper operation before opening.
2. Remove the handle on the side of the instrument using a #2 Phillips screwdriver.
3. Using a #1 Phillips screwdriver, remove the 22 4-40 screws that secure the top cover and set it aside.
4. Turn the instrument upside down. Remove the 12 4-40 screws that secure the bottom cover and set it aside.
5. On the DSIO Main module board, release the clamp on the ribbon cable connector and disconnect the ribbon cable (Figure 1).

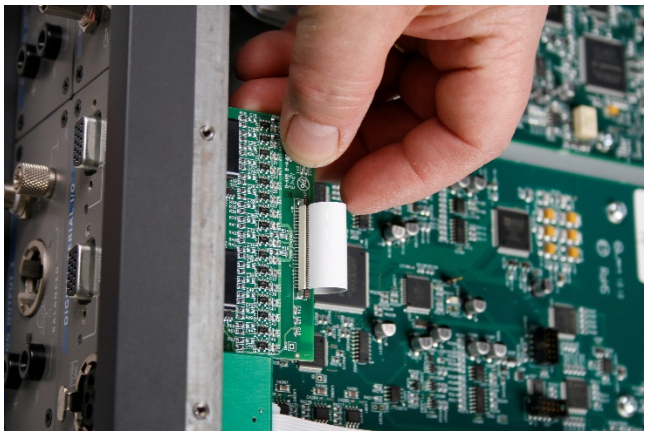


Figure 1 DSIO module ribbon cable.

6. Remove the four jack screws that secure the Transmitter and Receiver d-sub connectors to the front panel using a 3/16” socket wrench.
7. Remove the DSIO Panel module from the instrument and set it aside in a safe place. This will be reinstalled after the modifications are complete.
8. Remove the four jack screws that secure the Monitor connectors to the front panel using a 3/16” socket wrench.
9. Remove the four #1 Phillips head screws securing the front panel and remove it.
10. Position the instrument with the front facing you and identify the locations of the sixteen resistors to be removed. Please see Figure 2 as a reference locator.

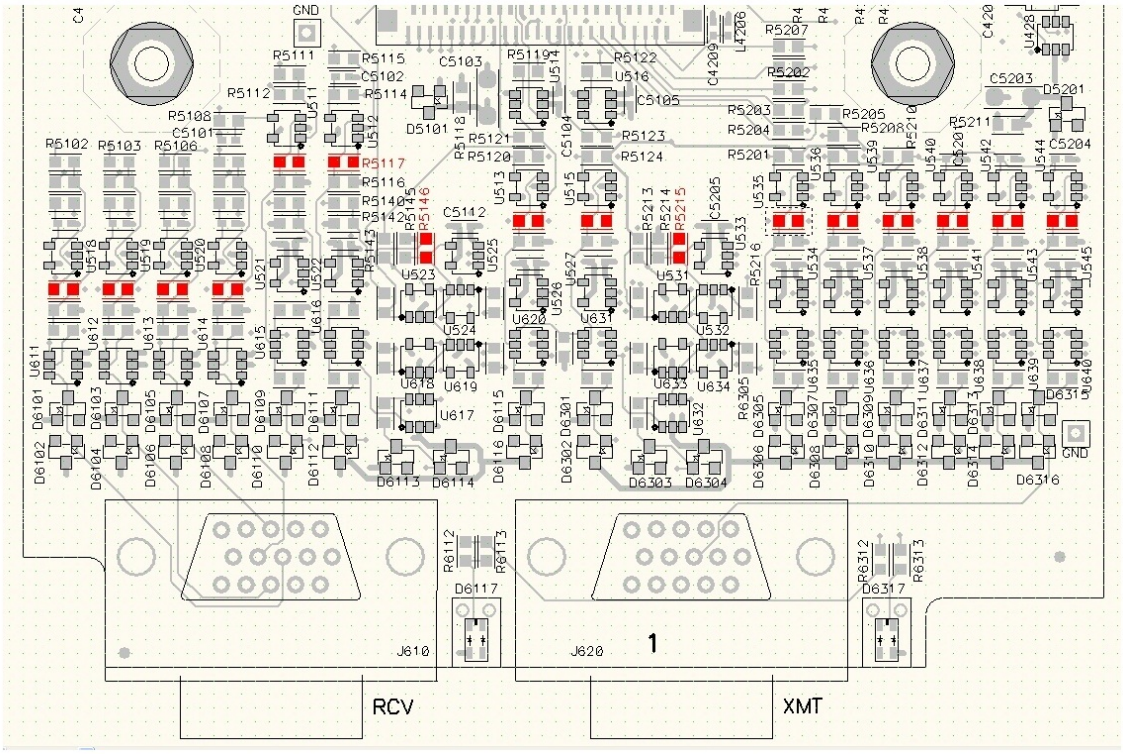


Figure 2 Resistors on the DSIO main board that will be removed.

11. With a fine tipped solder pencil, use a small size solder wick to remove the solder from one side of each resistor until there is no longer any solder in the joint. Next, repeat the solder removal operation on the second joint of each resistor. Then apply the solder pencil tip to the first joint while using a pair of fine point tweezers to gently apply some rotational force to the body of the resistor. The resistors should come free from the solder pads.
12. Safely dispose of the resistors.
13. Inspect the area were the resistors were removed for any signs of loose solder or flux material and clean it as necessary to avoid any short circuits.
14. Reinstall the DSIO Front panel using the four #1 Phillips head screws.
15. Using the 3/16” socket wrench, reinstall the four jack screws to fasten the Monitor D-sub connectors to the panel.
16. Reinstall the DSIO Panel module and secure the Transmitter/Receiver D-sub connectors to the front panel using the last four of the jack screws.
17. Reinsert the ribbon cable on the DSIO Main module.
18. Reinstall the top and bottom covers and the handle.
19. Download and run the APx Self Test (http://ap.com/display/file/534) to verify correct operation of the instrument.
20. If any check fails or the instrument otherwise does not function properly, please contact Hardware Technical Support at Audio Precision (service@ap.com) to obtain factory service.
21. Recalibrate the instrument if required.

Service Advisory Bulletin (APX-0028)
New APx-555 firmware must use v4.3 software

Date: 7/14/16
To: All Audio Precision Distributor Service Engineers

From: John Payne, Technical Support Hardware Engineer

Applies to: APx555 Analog Input Assembly (B4AI) replacement boards

Action: If the customer is using a version of APx500 software earlier than v4.3 a software patch must be installed.

Summary
Production has noted that some of our supplied A to D converters are not making our current noise specification (rise above 20 kHz). The failing parts are more sensitive to clock jitter and the results are a higher noise figure. Engineering has found a hardware fix that involves a rework of the FPGA firmware program that will need to be installed with the release of APx500 v4.3.
All APx555 Analog Input Assemblies (B4AI) produced beginning in July 2016 will have this new firmware installed, and will require that the instrument be run with version 4.3 or later.
If the customer is using 4.0, 4.1.1, or 4.2.1 versions of APx500 control software they will see a notification of "Unsupported hardware Configuration" when loading these earlier versions of software and using the modified Analog Input Assemblies (B4AI).
If the customer wants to continue to use any of the earlier versions of 4.0, 4.1.1, or 4.2.1 and does not want to upgrade to version 4.3. Then they need to download the patch file "FirmwareUpdateB4AIv2.0.zip"from the Audio Precision web site at ap.com, and follow the instructions provided with the patch file.

Service Advisory Bulletin (APX-0029)
Fix for APx515 models with intermittent AES optical operation using APx 4.2 (or higher) control software

Date: 5/15/17

To: All Audio Precision Distributor Service Engineers

From: John Payne, Technical Support Hardware Engineer

Applies to: All APx515 models produced before 4/20/17.

Action: Certain APX515 models will have intermittent AES optical operation using clock rates from 39k to 47k, 49k to 59k, and from 103k to 109.3k. This is being caused by a one bit shift in the sample rate. A hardware fix has been released to correct the intermittent operation.

Summary:
Two SMT resistors need to be changed on the BXAN board to correct this problem. Resistor pack RP 122 was 27 ohms and needs to be replaced with a 47 ohm model, AP part number 1974.0470.1
SMT resistor R 1221 was a 10k ohms and needs to be replaced with a 1k ohm, AP part number 1176.1001.1. Remove any flux residue from the rework area on the circuit board. No adjustments are necessary after this modification.

Tools needed:
#1 and #2 Philips screwdriver.
Hot air gun or solder wick.
Soldering pencil.
Static-protection wrist strap or ESD safe work space.

Caution: Perform all hardware removal and installation procedures in an ESD-protected (electrostatic discharge protected) work area, while observing all ESD handling requirements as described in ANSI/ESD S20.20-1999. As a minimum, use a grounded anti-static work mat and wrist strap.

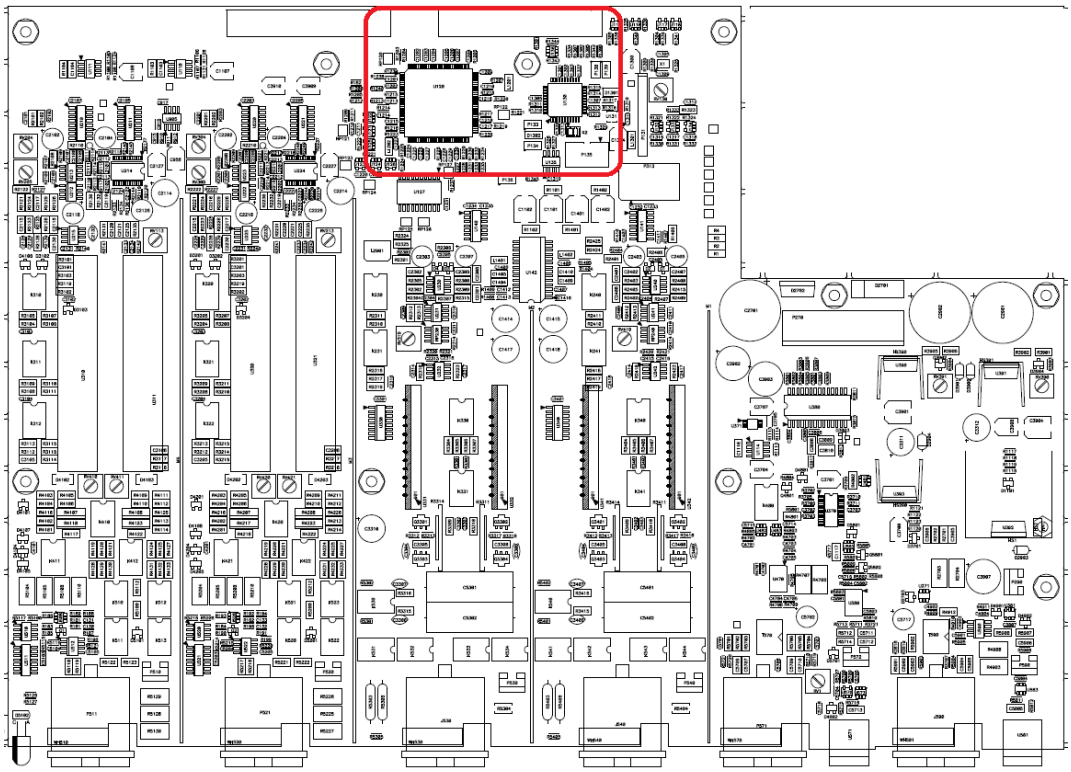


Figure #1. BXAN board.

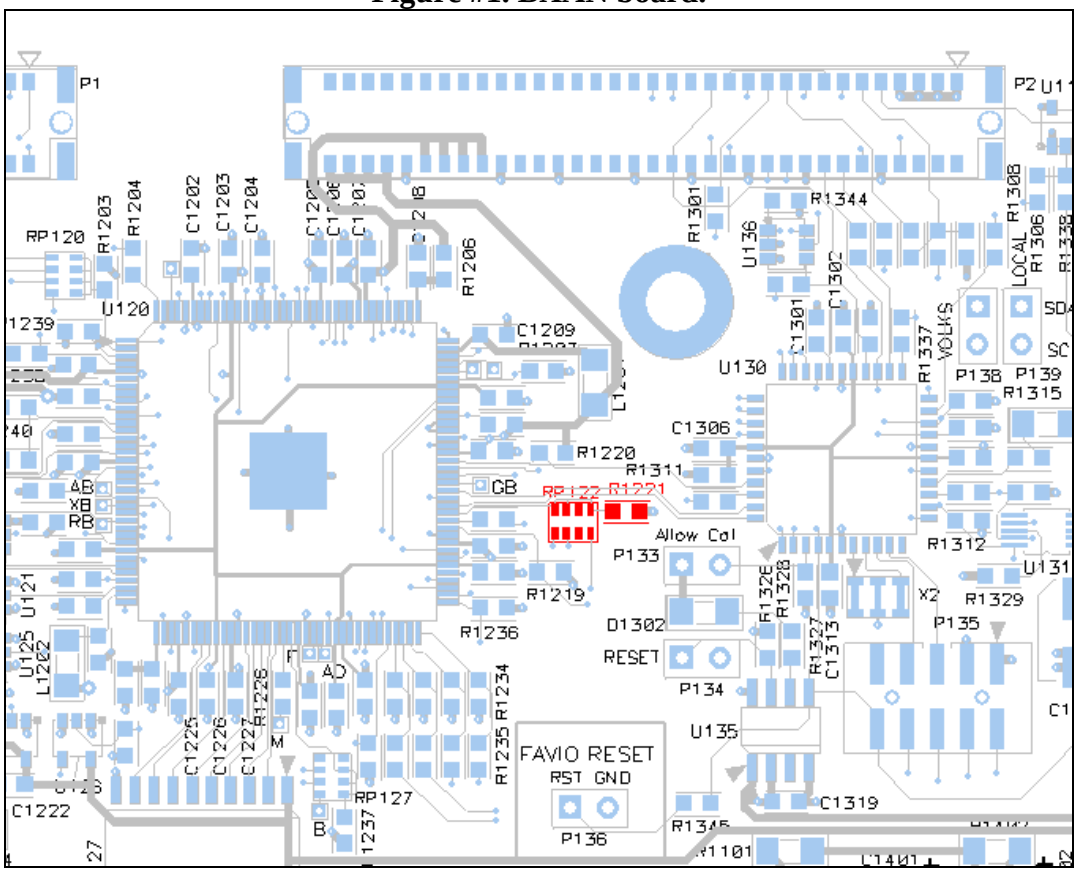


Fig #2 Close up view of the BXAN board

Service Advisory Bulletin (APX-0030)
New APX assemblies are now RoHS compliant

Date: 3/10/17

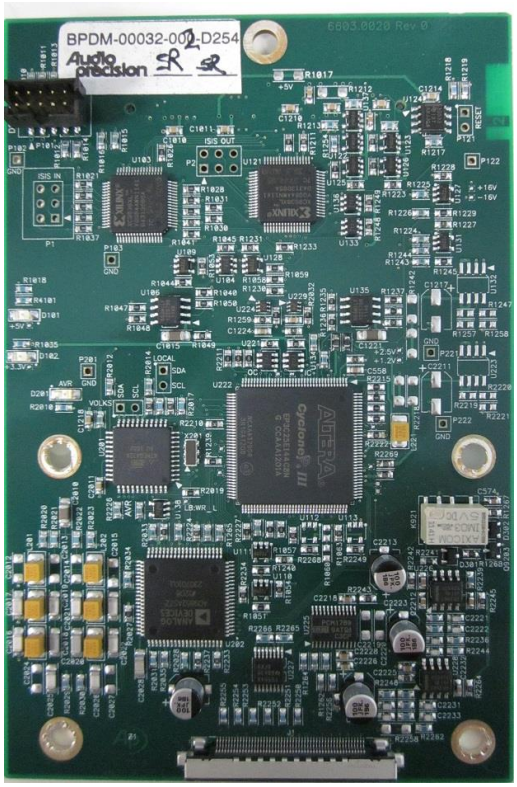
To: All Audio Precision Distributor Service Engineers

From: John Payne, Technical Support Hardware Engineer

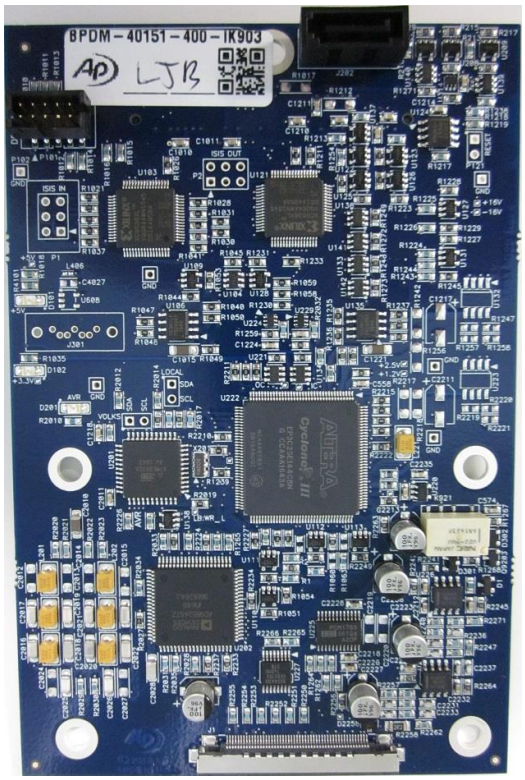
Applies to: All Audio Precision Products excepting the legacy products lines of the System Two family, the DCX-127, and the 2755 Switcher series.

Action: Beginning in mid-2017 Audio Precision will begin production of circuit board assemblies that are RoHS compliant. All future repairs on these assemblies must be also RoHS compliant. No exceptions allowed.For non-RoHS instruments with green assemblies, repairs can be made with non-RoHS materials.

Summary
To identify if the product in question is of a RoHS type, all circuit assemblies that are RoHS compliant are Blue or Violet in color.
All Non-RoHS compliant board will remain Green in color.



Non-RoHS assembly



RoHS assembly

Service Advisory Bulletin (APx-0031)
High THD readings on APx1701

Date: February 2018

To: All Audio Precision Distributor Service Engineers

From: John Payne, Technical Support Hardware Engineer

Applies to: APX1701 sn 10000 thru 10099

Action: Modify speaker output connections on the Titan power amplifier board, the output cable harness, and the SpeakOn panel connector.

Summary
The 1701 unit will not pass THD specs at full output into low impedance loads (4 ohm). This is caused by oxidized connections at the output spade lug terminals at the power output cable interface and at the front panel SpeakOn connector.
All APX1701 units with serial numbers higher that 10100 will have the SpeakOn cable connector wires soldered in place and the Titan board has had the output lug connections replaced with screw on connectors.

Tools and required Materials

- # 1 Philips screw driver
- # 2 Philips screw driver
- Needle nose pliers
- Wire cutters/wire stripper
- High wattage soldering tool

Pretesting
Conduct the APX1701 Self-Test Performance Check program on the instrument to verify proper operation before the modification. This will require using the APx1701 Self-Test Kit.

Procedure

1. Using a #2 Phillips screwdriver, remove the ten black screws on the top cover and the four screws on the top front panel. Remove the cover and screws and set them aside for later reassembly.

2. To modify the front panel SpeakOn output connector, remove the four speaker wire connections to the Titan power amplifier module. Using the needle nose pliers remove the red and black spade lug connectors for channel A and the blue and white spade-lug connectors for channel B from the Titan module.

3. Remove the SpeakOn connector by removing the four #1 Phillips screws and nuts, set the fasteners aside for reassembly later. Carefully remove the connector and wires through the front panel mounting hole.

4. Make a note of where each wire is connected to each lug on the connector (see figure #1). Remove each spade-lug connector from the SpeakOn connector.

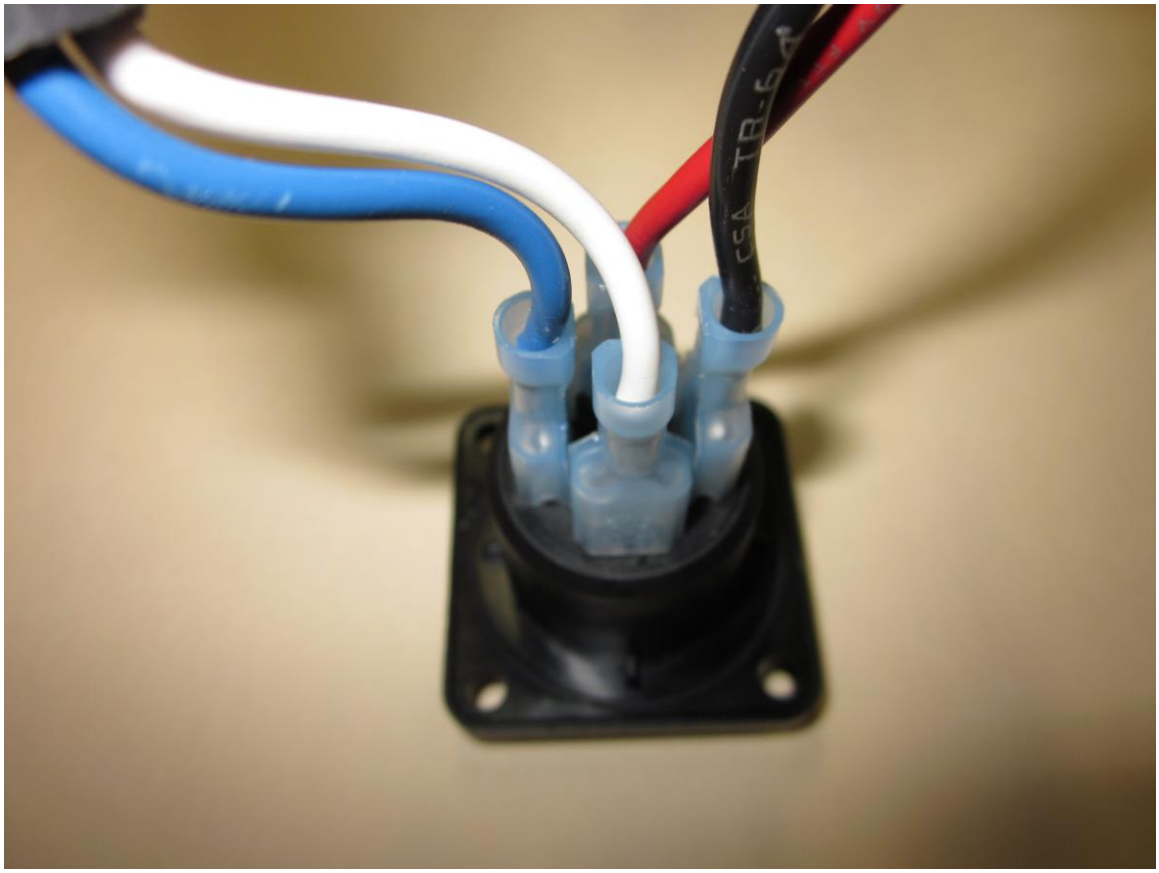


Figure 1

1. Using the wire cutters, cut off each of the eight spade-lug connectors from the red, black, blue, and white wires.

2. On each end of the four wires, strip .25 inch (1.5 cm) of insulation off and pre-tin the wire with solder. Following your notes for each wire location solder each wire to the spade lug on the SpeakOn connector as seen in figure 2.

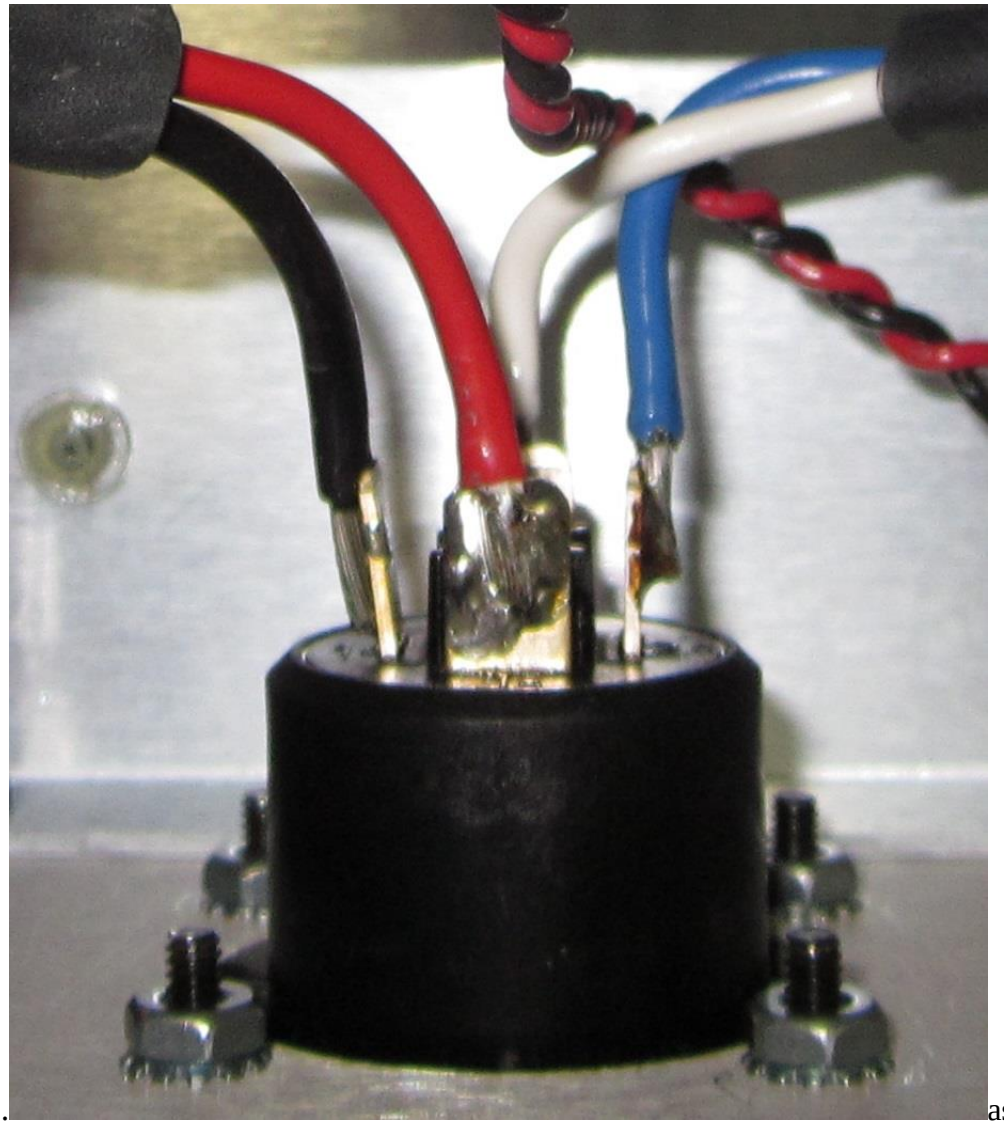

as

Figure 2

Reinsert wires through the front panel one set at a time, then reattach SpeakOn connector to front panel.

Re-solder SpeakOn cable wires to the Titan board as shown in figure 3.

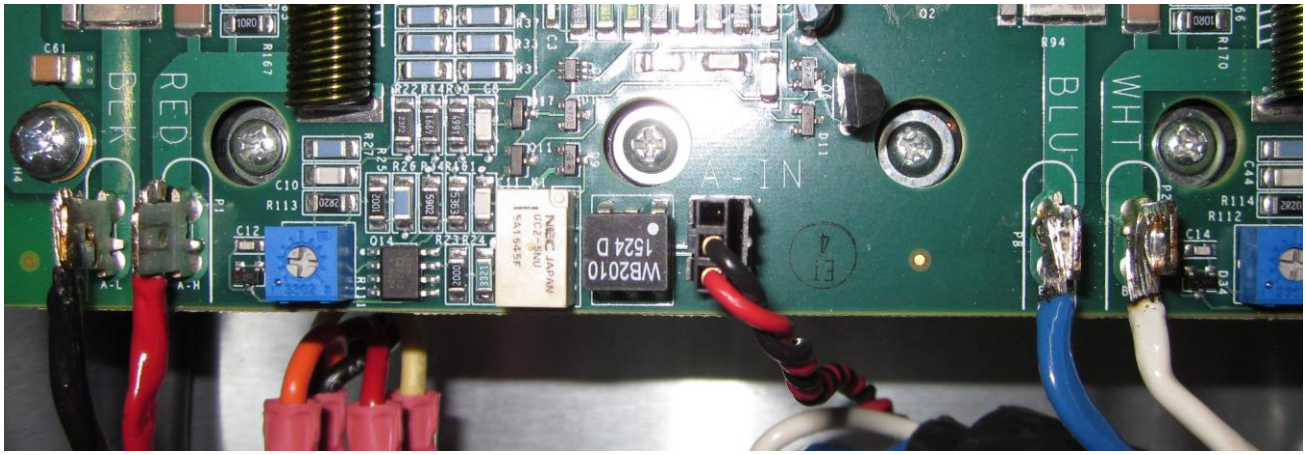


Figure 3

Re install cover and screws.

Conduct the APX1701 Self-Test Performance Check program on the instrument to verify the proper operation after the modification is complete. This will require using the APx1701 Self-Test Kit.

Service Advisory Bulletin (APX-0032)
APx500 B series BZD2 (USB 3) interface modules.

Date: 12/1/18

To: All Audio Precision Service Engineers

From: John Payne, Technical Support Hardware Engineer

Applies to:.
All APx500 B series instruments that have an USB interface failure.

Action:
A new BZOD-2 replacement module must be ordered directly from the AP factory specifically for each instrument.
The following information will be needed at the time of ordering a replacement module.

1. Model and serial number of the unit needing the replacement interface module.
2. Current version of software that the customer is using.

Summary:
All Apx500 B series instruments BZOD-2 interface modules contain internal software key box technologies that are encrypted. The internal programming for the BZOD-2 module can only be done at the Audio Precision factory. Each BZOD-2 will have the instrument model and the instrument serial number preprogramed into its on-board memory. In addition, all APx500 software options that were pre-purchased will need to be programmed into the replacement BZOD-2 before shipment to the service center.

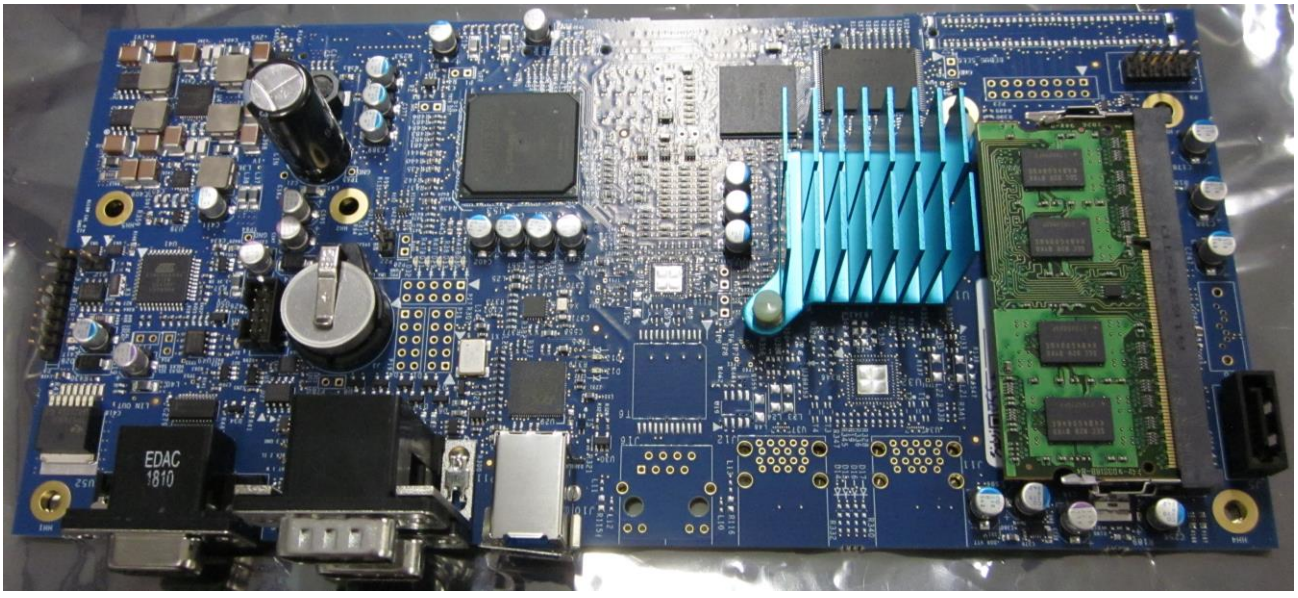


Figure 1. BZD2 UDB interface module.