

This space reserved for future revision information.
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1. Purpose

The purpose of this document is to provide product specifications for the Crown Audio Inc. CJ2000 amplifier.

2. Scope

This document pertains to the Crown CJ2000 amplifier only. This includes all AC input voltage variations.

3. Definitions

3.1. Minimum Specification

A specification that is 100% guaranteed to our customers, or a specification that must be met for proper operation of the amplifier.

3.2. Typical Specification

A specification that is not 100% guaranteed to our customers, or a specification that represents typical performance that can be expected of the amplifier.

3.3. Safety and Regulatory Specification

A specification that must be met in order to comply with regulatory standards.

3.4. Routine Test

Tests that are required on 100% of units manufactured per safety and/or regulatory specifications.

3.5. Acronyms and Abbreviations used in this document

- 3.5.1. A — Ampere
- 3.5.2. AC — Alternating Current
- 3.5.3. asl — above sea level
- 3.5.4. CCW — Counterclockwise
- 3.5.5. CMR — Common Mode Rejection
- 3.5.6. CW — Clockwise
- 3.5.7. DC — Direct Current

- 3.5.8. deg C — Degrees Celsius
- 3.5.9. deg F — Degrees Fahrenheit
- 3.5.10. F — Farad
- 3.5.11. ft — Foot
- 3.5.12. IM — Intermodulation
- 3.5.13. k — kilo ($\times 1 \times 10^3$)
- 3.5.14. M — Mega ($\times 1 \times 10^6$)
- 3.5.15. m — milli ($\times 1 \times 10^{-3}$)
- 3.5.16. ODEP — Output Device Emulation Protection
- 3.5.17. PIP — Programmable Input Processor
- 3.5.18. RMS — Root Mean Square
- 3.5.19. s — Second
- 3.5.20. SMPTE — Society of Motion Picture & Television Engineers
- 3.5.21. THD — Total Harmonic Distortion
- 3.5.22. THD+N — Total Harmonic Distortion plus Noise
- 3.5.23. V — Volt
- 3.5.24. W — Watt
- 3.5.25. μ — micro ($\times 1 \times 10^{-6}$)

4. Method

4.1. Electrical Test Equipment

- 4.1.1. All electrical test equipment must meet requirements specified in ELECTRICAL TEST EQUIPMENT SPECIFICATIONS (Crown Part Number 101900).

4.2. Test Methods

Where applicable, specific test procedures and methods are defined. Where not otherwise defined, commonly accepted methods of measuring the amplifier performance are to be used.

4.3. Test Conditions

UNLESS OTHERWISE SPECIFIED, ALL TESTS ARE PERFORMED UNDER THE FOLLOWING CONDITIONS:

- 4.3.1. AC Mains: Nominal voltage / frequency as appropriate for the amplifier being tested. Tolerance per ELECTRICAL TEST EQUIPMENT SPECIFICATIONS (Crown Part Number 101900).
- 4.3.2. Ambient Temperature: 20 to 30 degrees C.
- 4.3.3. Input Level Controls: Full CW (Minimum Attenuation)
- 4.3.4. Polarity Switch Setting: Unless specified otherwise, this specification applies to both possible positions for this switch.
- 4.3.5. Unless otherwise noted, all specifications indicate the performance requirements of a single channel operating while the other channel remains idle.

5. Minimum Electrical Specifications for Internal Channel

5.1. DC Offset

0V±-10mV at output terminals of amplifier.

5.2. Output Bias

5.2.1. Channel 1

300 mV ±50 mV measured across each base-to-emitter resistor of the output stage (R150, R165).

Set the bias by adjusting R134.

5.2.2. Channel 2

300 mV ±50 mV measured across each base-to-emitter resistor of the output stage (R250, R265).

Set the bias by adjusting R234.

5.3. Gain

5.3.1. Internal Channel

5.3.1.1. Test Conditions

The test signal shall be applied to the internal channel input. No signal applied to the external channel

Input Signal Amplitude (only INT driven, no signal on EXT): $V_{IN} \leq 1.4V_{rms}$.

Input Waveform: Sine wave

Input Frequency: 50 Hz.

Input shall be between pins 2 and 3 of the XLR input connector. Pin 1 of the connector is signal ground.

Positive voltage appearing on pin 2 with respect to pin 3 of the input XLR shall produce a positive voltage on pin 2 with respect to pin 3 of the THRU/HIGHPASS output XLR.

Polarity Switch Setting: This specification applies to both possible positions for this switch: 0 and 180.

Sub/Sub—Sub/Sat Switch Setting: This specification applies to both possible positions for this switch: SUB + SAT and SUB + SUB.

Input Attenuators: Fully clockwise (no attenuation).

5.3.1.2. Internal Channel Amplifier Output voltage shall be $40.41 \times V_{IN}$ Vrms ±10% between the red and black output wires. *The red wire is the signal ground.*

5.3.1.3. Signal LED must turn on at VIN levels higher than 100 mV rms.

5.3.2. External Channel

5.3.2.1. SUB + SAT switch setting

5.3.2.1.1. Test Conditions

The test signal shall be applied to the external channel input. No signal applied to the internal channel input.

Input Signal Amplitude (only EXT driven, no signal on INT): $V_{IN} \leq 1.4$ Vrms.

Input Waveform: Sine wave

Input Frequency: 1 kHz.

Input shall be between pins 2 and 3 of the XLR input connector. Pin 1 of the connector is signal ground.

Positive voltage appearing on pin 2 with respect to pin 3 of the input XLR shall produce a positive voltage on pin 2 with respect to pin 3 of the THRU/HIGHPASS output XLR.

Polarity Switch Setting: This specification applies to both possible positions for this switch: 0 and 180.

Sub/Sub—Sub/Sat Switch Setting: : SUB + SAT.

Input Attenuators: Fully clockwise (no attenuation) .

5.3.2.1.2. External Channel Amplifier Output

Output voltage shall be $40.41 \times V_{IN}$ Vrms $\pm 10\%$ between pins 1 and 4 of the output Speakon[®] connector. *Pin 1 is the signal ground.*

5.3.2.1.3. Signal LED must turn on at V_{IN} levels higher than 100 mV rms.

5.3.2.2. Sub + Sub switch setting

5.3.2.2.1. Test Conditions

The test signal shall be applied to the external channel input. No signal applied to the internal channel input.

Input Signal Amplitude (only EXT driven, no signal on INT): $V_{IN} \leq 1.4$ Vrms.

Input Waveform: Sine wave

Input Frequency: 50 Hz.

Input shall be between pins 2 and 3 of the XLR input connector. Pin 1 of the connector is signal ground.

Positive voltage appearing on pin 2 with respect to pin 3 of the input XLR shall produce a positive voltage on pin 2 with respect to pin 3 of the THRU/HIGHPASS output XLR.

Polarity Switch Setting: This specification applies to both possible positions for this switch: 0 and 180.

Sub/Sub—Sub/Sat Switch Setting: SUB + SUB

Input Attenuators: Fully clockwise (no attenuation).

5.3.2.2.2. External Channel Amplifier Output

Output voltage shall be $40.41 \times V_{IN}$ Vrms $\pm 10\%$
 between pins 1 and 4 of the output Speakon[®]
 connector.

Pin 1 is the signal ground.

5.3.2.2.3. Signal LED must turn on at V_{IN} levels higher than 100 mV rms.

5.4. Quiescent Power Draw

5.4.1. Quiescent power draw < 90 Watts. Observe that POWER ON LED turns on.

5.4.2. Test Conditions

- No load connected to the amplifier outputs
- Line voltage shall be nominal $\pm 1\%$
- No input signal applied to the amplifier input

5.5. Frequency Response

Amplifier output (dBr)

All tolerances +/- 2 dB, unless shown otherwise.
 0 dBr = 1 W, 8 ohms,
 each input individually driven

Configuration	FREQUENCY (Hz)				
	20	50	104	2000	2000
(CHANNEL) SUB/SAT					
(INT) SUB+SAT	-17.0	0.0 (REF)	-6.0	<-56.0	<-5
(EXT)SUB+SAT	-62.0	-30.0	-6.0	0.0 (REF)	
(INT) SUB+SUB	-17.0	0.0 (REF)	-6.0	<-56.0	<-5
(EXT) SUB+SUB	-17.0	0.0 (REF)	-6.0	<-56.0	<-5

Line output (thru connectors) (dBV)

For both inputs, INT and EXT
 $V_{IN} = 1V = 0$ dBV

Configuration	FREQUENCY (Hz)				
	20	50	104	2000	2000
SUB+SAT	0 +/- 0.5	0 +/- 0.5	0 +/- 0.5	0 +/- 0.5	0 +/- 0
SUB+SUB	----	-30.0 +/- 2	-6 +/- 2	0 +/- 0.5	0 +/- 0

PWA level in ICT. The list of components needs to be approved by Crown Product Engineering.

5.6. Polarity Switch

When polarity switch (0/180) is activated, it must change phase relative to the respective input by nominally 180 degrees between the two positions of the switch. Test on SUB +SUB position, both channels driven. Verify at 52.7 Hz (crossover frequency) that the 0 is within +/- 10 degrees of phase shift for both channels. After changing position of the switch the phase must be 180 +/- 10 degrees. Test for both internal and external inputs.

5.7. Level Adjust**5.7.1. CW=Maximum Gain****5.7.2. CCW = Minimum Gain ($\leq 0.1\%$ of max.= 60 dB attenuation)****5.7.3. Gain must reduce smoothly as controls are rotated from full CW to full CCW****5.8. Slew Rate****6 V/ μ s < Slew Rate < 8 V/ μ s****5.8.1. Test Conditions****Input waveform is a 10kHz square wave****Output amplitude is > 40Vpk****Measurement is taken from the 20% to 80% points of the slopes****Output load is 8 ohms****SUB + SAT position.****External channel only.****5.9. Bench Power****5.9.1. SUB + SUB position****5.9.1.1. 4 Ohm load ≥ 180 W/Ch – Minimum Specification****This is a temporary specification until engineering approves a new specification of 550 W/Ch****5.9.1.2. Test Conditions****Both the internal and the external channels shall be driven simultaneously into a load while measuring power output.****5.9.1.3. Both channels, internal and external****Test Frequency = 50 Hz sinewave****THD+N = 0.5%****5.9.2. SUB + SAT position****5.9.2.1. 4 Ohm load ≥ 660 W/Ch – Minimum Specification****5.9.2.2. Test Conditions****External channel driven into a load while measuring power output.****Test Frequency = 1000 Hz sinewave****THD+N = 0.5%****5.10. Current Limit****5.10.1. 1 Ohm Load****17 Apk to 41 Apk.****This is only a temporary figure, as it needs to be reviewed to make sure it is within proper SOA of the output transistors.****5.11. Short Test Operation**

5.11.1. No amplifier failure

5.11.2. Both channels typically go into standby within 1 second. The output relays should disconnect the output of the amplifier from the load. Fault light must turn on.

5.11.3. The amplifier typically resumes normal operation in less than 8 seconds after the short is removed from the output.

5.11.4. Test Conditions

Input waveform = 50 Hz sinewave

Output amplitude = 15 Vrms

Amplifier Load = shorted both channels for 5 seconds minimum

5.12. Inductive Load Operation (External Channel)

5.12.1. Output of amplifier should resume normal operation.

5.12.2. Output amplitude should be greater than 5 Vrms and less than 17 Vrms.

5.12.3. The amplifier typically resumes normal operation in less than 8 seconds after the short is removed from the output

5.12.4. Test Conditions

Load = 8 Ohms in parallel with 159uH for 5 seconds minimum.

Input Frequency = 1 kHz sinewave

5.13. Compressor Operation

5.13.1. Output shall remain at rated output power or higher.

5.13.2. THD+N < 5% measured at the output of the amplifier. Clip LEDs must turn on.

5.13.3. Test Conditions

Input driven 3dB greater than input required for rated 8 ohm power, both channels driven with 50 Hz applied to the INT input, 50 Hz, SUB + SUB mode.

5.14. 20kHz THD+N Testing (External Channel Only)

THD+N < 0.5%

5.14.1. Test Conditions

Output amplitude = 40 Vrms

Load = 8 Ohms

Input = 20kHz Sine wave

External channel driven only

Measurement equipment filter 20 Hz to 300 KHz passband

5.15. Residual Noise – Internal Channel

1200 microvolts rms maximum

5.15.1. Test Conditions

Load = 8 Ohms

Output equipment filters = 20Hz-20kHz

Amplifier Input = terminated at less than 1 kohm.

SUB/SAT: applies to both positions SUB + SUB and SUB + SAT

Attenuation = 0 (Fully CW)

Both polarities, 0 and 180

5.16. Residual Noise – External Channel

SUB + SUB = 1200 microvolts maximum

SUB + SAT = 600 microvolts maximum

5.16.1. Test Conditions

Load = 8 Ohms

Filters = 20Hz-20kHz

Amplifier Input = terminated at less than 1 kohm.

Attenuation = 0 (Fully CW)

Both polarities, 0 and 180

6. Typical Electrical Specifications

6.1. Power On Delay

6.1.1. The time from power switch closure to uncompressed signal presence less than 8 seconds.

6.2. Capacitive Load Operation

6.2.1. Output signal shall be stable with no cutouts, ringing, or oscillations.

6.2.2. THD+N < 0.1%

6.2.3. Test Conditions

Load = 8 Ohms in parallel with 1.88uF

Input waveform = 0.98 Vrms sine wave

Input Frequency = 20 kHz

6.3. Fan operation

Fan must turn on in less than 30 seconds from the time a 50 Hz signal is driven in order to drive both channels with 325 W on 2 ohms loads, on the SUB + SUB condition.

7. Safety and Regulatory Specifications

7.1. Safety Standards

EN 60065: 1998 Safety Requirements – Audio Video and Similar Electronic Apparatus

CAN / CSA – E60065-00: Safety Requirements – Audio, Video and Similar Electronic Apparatus.

UL 6500 2nd Edition: Audio / Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use.

7.2. Electromagnetic Compatibility Standards

7.2.1. Emissions

EN 55103-1:1995 Electromagnetic Compatibility – Product Family Standard for Audio, Video, Audio-Visual and Entertainment Lighting Control Apparatus for Professional Use, Part 1: Emissions

EN 55103-1:1995 Magnetic Field Emissions-Annex A @ 10 cm and 1 M

EN 61000-3-2:1995 Limits for Harmonic Current Emissions (equipment input current ≤ 16 A per phase)

EN 61000-3-3:1995 Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems Rated Current =16A

EN 55013:1998 + A1: 1998 Limits and Methods of Measurement of Radio Interference Characteristics of Sound and Television Broadcast Receivers and Associated Equipment: Radiated, Class B Limits; Conducted, Class A

7.2.2. Immunity

EN 55103-2:1996 Electromagnetic Compatibility – Product Family Standard for Audio, Video, Audio-Visual and Entertainment Lighting Control Apparatus for Professional Use, Part 2: Immunity

EN 61000-4-2:1995 Electrostatic Discharge Immunity (Environment E2-Criteria B, 4k V Contact, 8k V Air Discharge)

EN 61000-4-3:1996 Radiated, Radio-Frequency, Electromagnetic Immunity (Environment E2, criteria A)

EN 61000-4-4:1995 Electrical Fast Transient/Burst Immunity (Criteria B)

EN 61000-4-5:1995 Surge Immunity (Criteria B)

EN 61000-4-6:1996 Immunity to Conducted Disturbances Induced by Radio-Frequency Fields (Criteria A)

EN 61000-4-11:1994 Voltage Dips, Short Interruptions and Voltage Variation

7.3. Routine Test

Tests defined in this section are required to be performed on every amplifier before shipment per UL 6500, Annex N.

7.3.1. Protective Earth Connection

7.3.1.1. Definition

Verify the integrity of the connection between the amplifier chassis and the ground connection of the power cord.

7.3.1.2. Specification

7.3.1.2.1. 0.1 ohms or less

7.3.2. Dielectric Strength Test

7.3.2.1. Specifications

7.3.2.1.1. Test Voltage:

Amplifier Mains Voltage	Voltage (1 second)
≤ 150 Vrms	1530 VAC
>150 Vrms	3054 VDC

7.3.2.2. Test Conditions

- 7.3.2.2.1. Voltage is applied to the power cord terminals, between safety ground and line/neutral (line and neutral are connected together).
- 7.3.2.2.2. Initially, not more than half of the prescribed test voltage is applied, then it is raised with a steepness not exceeding 1530 V/ms to the full value which is held for 1 second to 4 seconds.
- 7.3.2.2.3. During the test the amplifier power switch should be in the ON position.
- 7.3.2.2.4. Trip current set at 15 mA.
- 7.3.2.2.5. Alternate values for 1 minute test may be authorized by the Safety Engineer.

7.4. Other Standards; None

8. Environmental Specifications

8.1. Operating Environment

The amplifier shall meet all electrical specifications listed in this document over the full range of the following operating environmental conditions.

8.1.1. Ambient Temperature

20 to 30 deg C

8.1.2. Humidity

50% to 95% non-condensing

8.1.3. Altitude

-400 ft asl to 5000 ft asl

8.2. Non-Operating Environment

The amplifier shall meet all electrical specifications listed in this document over the full range of operating environmental conditions after having been exposed to any and/or all of the following non-operating environmental conditions.

8.2.1. Ambient Temperature

-30 to 60 deg C

8.2.2. Humidity: 10% to 100%

If the amplifier is exposed to condensing humidity, sufficient time must be allowed for complete evaporation of all condensate before testing begins.

8.2.3. Altitude

-400 ft asl to 45000 ft asl

9. Mechanical Specifications

9.1. Corrosion

- 9.1.1. Metals shall be corrosion resistant type or suitably processed to resist corrosion. Some exceptions may apply if functionality of the device such as a heat sink is impaired by coatings. The use of any protective coatings that may crack, chip or scale with normal use, aging, or extremes of environment

specified herein, shall be avoided.

9.2. Sharp Edges

9.2.1. Sharp projections and edges on parts and materials accessible to manufacturing or service personnel shall be minimized.