

# NAKSA 80 PRODUCT DESCRIPTION

May, 2013

## Description

The NAKSA 80 is a 2013 developed full solid state, Class AB stereo power amplifier module of unusual design delivering 80 watts RMS into an 8 ohm load using a 300VA 30-0-30Vac power transformer.

The NAKSA 80 is a fully built and tested stereo amplifier. For domestic use, the user connects the two secondaries of a suitable transformer, the signal inputs, earth wire, and the speaker outputs. The entire stereo amplifier, including all power supply circuitry, is built onto a single high quality, double-sided circuit board of 280mm x 70mm.

## The Design

The NAKSA 80 module comprises both amplifier channels and a dual power supply. The output devices are mounted beneath the circuit board, directly onto a heatsink or suitable chassis (metal). The robust, compact and cooled construction is assembled with premium quality components and is tested for high quality, long lasting domestic use.

The NAKSA 80 has evolved from the very successful NAKSA 70, though with different topologies. The use of surface mount components permit a compact, neat layout. Topology enhancements include a new voltage amplification stage, improved offset control, radical output stage drive and bias control. Two robust complementary Mosfet output devices per channel are used. Other details are indicator LEDs, a bipolar power output connector for powering accessories, a chassis earth lift, and high quality, insulated fuse holders. The amplifier can be used immediately out of the package with all settings factory adjusted.

The NAKSA 80 circuit board is directly mounted on a flat pack heatsink of high thermal capacity 0.37C/watt. Both channels remain cool at full power in even the hottest climates. The NAKSA 80 requires a single 300VA toroidal (or EI) transformer with two 30Vac secondary windings (not supplied with the module). The on board dual power supply provides isolated +/-42V rails per channel. The power supply is effectively a dual mono configuration. The suitable toroidal transformer should have better than 8% regulation. Good toroidal transformers are supplied by Harbuch (Australia) or Plitron (Canada), however aside from the critical hum issues, the transformer has little sonic impact because most of the power supply benefits are conferred by the filter caps and rectifiers which are incorporated into the center of the module.

The NAKSA 80 runs very efficiently in Class AB with a quiescent output stage current of 100mA, delivering large sound scale, slam and clarity to rival the best Class A designs, with none of the troublesome thermal problems. Power consumption of both channels at idle is 20 watts. NAKSA amplifiers are part of the green revolution – they are VERY efficient!

Key aspects of the NAKSA 80 design are:

- Single module comprising two channels, dual power supply, and extensive earthing systems.
- Low power 1206 series surface mount resistors, permitting high density packaging. In critical areas, high quality thin film resistors are fitted. High power resistors are installed where higher dissipation is needed.
- A new output bias circuit offers very high rail efficiency and higher linearity of the output Mosfet transistors. The 'Voltage Amplification Stage' (VAS) is isolated but directly connected to the output transistors, further improving the amplifier performance.

- Both nested and global feedback as used in previous AKSA designs is featured. The judicious ratio of these modes strongly improves image and musicality.
- The power supplies use fast, soft recovery discrete rectifier diodes (BYV32E-150) arranged as two independent bridge rectifiers. These both simplify the transformer connection while improving noise performance by implementing a 'Floating Transformer'. This significantly reduces the effects of charging currents, reduces higher order artifacts from ripple, and delivers a quieter amplifier.
- The power supply filter capacitors are arranged as a 'Bifurcated Power Supply'. The high quality capacitor bank totals 17,600uF (8\*2,200uF).
- The NAKSA 80 turns on and off completely free of noisy thumps, without the use of speaker relays, again improving sonic quality.
- A connector is fitted for front panel LED(s), offering very easy connection of indicators.
- A three pin connector is fitted for auxiliary power for a preamp, balanced input stage or additional accessories if required.
- A mains safety earth lift network is provided on the amplifier module.
- No protection other than fuses is used, as most protection circuits degrade the sound quality.

### **The NAKSA 80 Sound**

The NAKSA 80 exhibits almost eerie silence. The sound quality gives extraordinary low frequency grip, startling dynamics, crystalline clarity, and resolution to best many Class A amplifiers. This helps discerning audiophiles 'see into the music', forgetting completely the electronics in the experience. The warmth and image depth are most unusual for solid-state amplifiers, reflecting single ended design combined with an unusual feedback network. The NAKSA 80 features a harmonic profile which is benign to music, being second harmonic dominant with higher orders monotonically decreasing. This fosters warm engagement with the music without penalty to resolution. The NAKSA 80 design employs elegant and reliable circuit topology to offer stunning sound quality, genuinely rivaling the best audiophile grade amplifiers in the market. The NAKSA 80 truly represents the pinnacle of development of the Aspen range of amplifiers. The elegance and compactness of the NAKSA 80 gives it stunning looks and superb sound at a moderate cost.

### **NAKSA 80 Specifications**

- Maximum power: 80 watts into 8 ohms, or 120 watts into 4 ohms
- Distortion at 1 watt (1KHz, 8ohms): TBD%
- Distortion at 12.5 watts (20dB, 1KHz, 8ohms): TBD%
- Frequency Response (at 12.5 watts into 8 ohms):
  - 1dB down at 6 Hz,
  - 1dB down at 150 KHz.
- Input impedance: 26 Kohms
- Gain: 26 (or 28.3dB)
- Input sensitivity: 972mV RMS for 80 watts into 8 ohms.
- Output stage bias: Adjust to between 100mA to 120mA (invariant hot or cold).
- Output Offset: Adjust to less than 10mV when warm.
- Circuit Board Size: 280mm by 70mm, 2mm FR4, two layers, 70um copper clad.
- Heatsink: Conrad MF30-75, 300mm by 75mm (or case alone if used)
- Fuses: 10 Amp, 20mm by 5mm, slow blow
- Transformer: 300VA toroid with two 30 Vac secondary windings (not supplied)
- Amplifier rail voltage: Do not exceed 45 volts (42 volts recommended)
- Mains fuse: A 5 Amp mains fuse is recommended for 230 Volt AC.

## Warranty

12 month warranty, excluding abuse. The designer, Hugh R. Dean, has 18 years of experience in designing, building and selling audio amplifiers. Email backup is available, usually overnight.

## Building a NAKSA 80 Amplifier

The NAKSA 80 product shipment includes:

- A fully assembled circuit board module containing an integrated power supply (rectifiers, filter capacitors and fuses), and two amplifiers.
- 300mm by 75mm Conrad MF30-75 heatsink, machined and tapped, with the NAKSA 80 module attached. Alternatively, the NAKSA 80 module can be supplied mounted in a custom designed 3mm thick Aluminium chassis, which acts as the heatsink, at an additional cost.
- Two RCA input connectors (one Red, one Black).
- Coaxial input cable.
- Two speaker 'hot' leads with integral 1uH inductor.
- Two speaker 'cold' leads.
- Front panel power indicator Green LED.
- Chassis ground wire.
- Four crimp spade connectors for the transformer secondary connections.
- Heatshrink tubing.
- Detailed build instructions, and Email support.

## You will need to supply:

- A single 300VA transformer with two secondaries of 30 volts RMS AC (Note: Not center tapped).
- IEC power entry sockets, with integral mains fuse.
- A suitable mains power switch.
- Speaker binding posts.
- Suitable chassis (a suitable custom designed Aluminium chassis is available at an additional cost).

## What needs to be done by you:

- Mount transformer, IEC mains socket, mains switch, indicator LED, speaker connectors, and input connectors in the chassis.
- Use a 5 amp mains fuse for 230 volts AC, or a 10 amp fuse for 115 volts AC mains.
- Mount NAKSA 80 module heatsink in chassis. Ensure adequate air flow around heatsink and the NAKSA 80 module.
- Connections to install the NAKSA 80 module:
  - Connect mains earth to chassis earth (very important).
  - Chassis earth to NAKSA 80 module (also very important).
  - Input mains to the mains power switch.
  - Power switch to the transformer primary.
  - Transformer secondaries to the NAKSA 80 module.
  - Input RCA connectors to the NAKSA 80 module.
  - Speaker wires from the NAKSA 80 module to the speaker connectors.
  - Power indicator LED to the NAKSA 80 module.
- Read the Caution note below before turning on!
- Adjust amplifier offset level (both amplifiers) with P2 trimpot. This will have been set, but should be checked at installation. Adjust after the amplifiers have been idling in still air for 20 minutes.

- Adjust amplifier bias level (both amplifiers) with P1 trimpot. This will have been set, but should be checked. Set to 35mV across R22 (0.33ohm) for 106mA, when the amplifiers have been idling in still air for 20 minutes.

**Tools required:**

- Soldering iron, solder etc.
- Multimeter for setting offset and bias level.
- Screw drivers, needle nose pliers, fine wire cutters.

**Caution!**

The NAKSA 80 is **not** fitted with short circuit protection, speaker offset protection, or speaker relays. If the amplifier output is accidentally shorted to ground, then the fuses will eventually blow, however the amplifier will have most likely suffered damage to the output transistors and/or the power supply! The speaker leads should only ever be plugged in or out with the amplifier turned **off**.

The NAKSA 80 was deliberately designed without short circuit protection or speaker relays as these frequently interfere with the sound quality. With high reliability assembly, minimal protection never causes any operational issues, and in fact the NAKSA 80 was deliberately designed this way as active protection circuits frequently interfere with the sound quality. Further the NAKSA 80 does not require a speaker relay as it turns both on and off noiselessly and does not become unstable when being powered down.

**About Aspen Amplifiers**

Aspen Amplifier commenced in 1995, and sold amplifier modules under the name 'Aspen Kit Set Amplifiers', known as the AKSA name. The first AKSA's were the Glass Harmony, AKSA555, AKSA100, Lifeforce55 and Lifeforce100 models, then the Soroya 205, and finally a New series of AKSA amplifiers, the NAKSA brand. The first NAKSA was a 70 watt amplifier (the NAKSA 70) and then a 100 watt version (the Naksa100). The current amplifier models are the NAKSA 80 (replacing the NAKSA 70), and the Naksa100.

**Contact**

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