

**Power measures taken according to audison standard 1998 edition.**

- 12 VDC and 13.8 VDC.
- 1 KHz or crossover cut-off frequency.
- 0.3% THD nominal power; 1% THD continuous power.
- Tolerance: +10%; -5%.
- Continuous power given by RMS Voltage measured on resistive load.
- The nominal power of the amplifier upon a battery voltage of 12 Volts with a 4 Ohms load and with all channels in function.

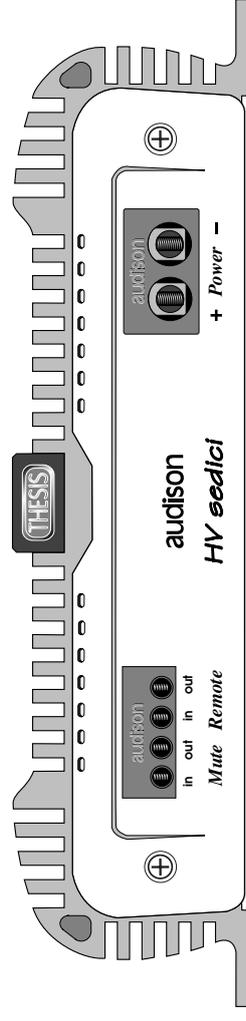
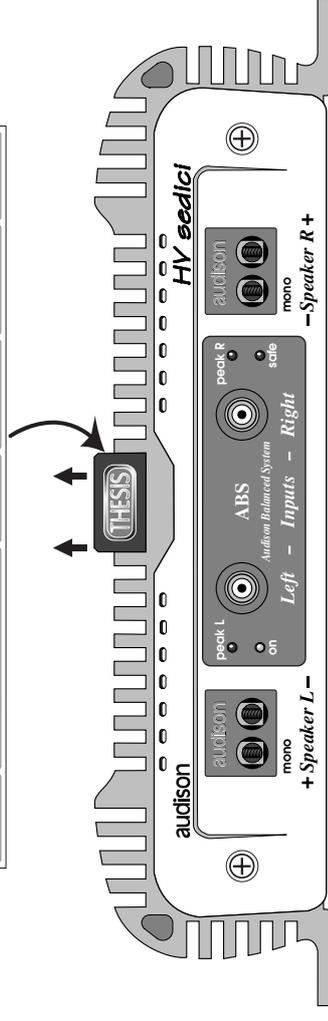
**THESIS**  
components

audison

## OWNER'S MANUAL

**Car power amplifier**

# HV sedici THK



PRINTED IN ITALY - Code 10124600

**eletrimedia**

Strada Regina Km 3,5 • I 62018 Potenza Picena (MC) • Tel. 0733/870.870 • Fax 0733/870.880 • <http://www.audison.com>

## INTRODUCTION

The **HV sedici THK** amplifier is the firstborn in a new family of high performance car amplifiers and other devices called **THESIS**.

It is endowed with highly innovative technologies and circuit solutions and its realization required big efforts and investments for research and development.

The purpose was to realize an amplifier that had to be a "milestone" in the evolutive history of **AUDISON** products.

Its structure in the circuit layout can be identified at two levels: the first one (power) is entirely on the mother circuit board and it collects all components which handle high currents and need warmth dissipation; the second one (signal and control) is located on special surface mounting devices which perform all complex functions of the whole device.

This peculiar design technique allowed the study and optimization of the signal paths and the blocking of the interactions among the different stages.

The **HV sedici THK** amplifier is constituted by three main parts: preamplifier, final power stage and power supply.

## PREAMPLIFIER

The **HV sedici** amplifier is supplied with an independent preamplifier unit, where the general sensitivity can be regulated in the  $0.2 \div 1V$  range.

This unit is provided with an exclusion possibility allowing the connection with the external preamplifier.

The input signal is applied to the ABS (Audison Balanced System) connector in balanced or unbalanced way and to the MA-1X module through two polypropylene capacitors. The MA-1X circuit constitutes the input interface for audio signals, it is characterized by a FET-BJT hybrid circuit in superintegrated CASCODE configuration in a single chip whose features are: max power supply  $\pm 24VDC$ , S/N ratio: 125 dBA (1 KHz - 1V), Slew Rate:  $25V/\mu S$  (20 Vpp), Bandwidth:  $DC \div 1MHz$ .

## FINAL POWER STAGE

The balanced or unbalanced audio signal (selectable option) applied at the input can directly drive the final stage without the preamplifier interposition.

Excluding the preamplifier the final stage sensitivity can be regulated between  $1.0 \div 5V$ .

The signal coming from the MA-1X module arrives in balanced connection to the TOMAHAWK module which makes the driving of the final stages in voltage and the thermic stability control.

The internal circuit is characterized by a double complementary differential amplifier in CASCODE and current mirror combination. This circuit is integrated on BJT chips whose components undergo a laser trim for the maximum tolerances reduction.

## REGULATIONS

All controls are located on top of the device.

- MONO ON-OFF: see MONO connection.
- BALANCED-UNBALANCED: see balanced-unbalanced connection.
- PREAMP ON-OFF: see connection to external preamplifier.
- L-R LEVELS: amplifier sensitivity adjustment, separated for the two channels.

## PROCEED AS FOLLOWS

Make device configuration according to the radio-cassette player requirements, through the above mentioned controls and regulations.

- 1) Set the two L-R LEVELS potentiometers toward minimum (counterclockwise).
- 2) Turn radio-cassette player volume control to about  $3/4$  of maximum volume.
- 3) Set the two L-R LEVELS toward maximum sensitivity until you get sporadic lighting of PEAK R-PEAK L with high dynamic musical passages.

**IMPORTANT:** if you should hear distortion phenomena without the peak L-R lighting up it means that a distorted signal is coming from the radio-cassette player. In this case turn radio-cassette player volume down until there's no longer any distortion. Repeat calibration operation omitting step 2.

## PROTECTIONS

The device is provided with several electronic protections which protect the amplifier from dangerous or wrong functioning conditions, avoiding to interfere with the music signal in order to get the best performances in any conditions.

- Outputs protection: any type of short circuit in the speaker wires, be it between themselves or to ground, will cause no damages.
  - Temperature protection: anomalous operating conditions or high ambient temperature (above  $60^{\circ}C$ ) that doesn't allow the amplifier to discharge the heating produced (maximum working temperature of the device  $80^{\circ}C$ ) caused intervention of the protection.
  - Protection against inverted polarity of the power supply: if the polarity of the power supply cables should be mistakenly inverted, the electronic circuitry will be protected by burning the external fuse that will have to be replaced by an identical one.
  - Protection against continuous output current.
  - Protection against excessively low or dangerous loads.
- A front red LED (SAFE) indicates intervention of protection circuits. Once the cause of malfunction is eliminated you only need to turn off radio-cassette player and turn it back on in order to have the device function again. The amplifier will return to normal function.

## OUTPUTS CONNECTION

**THREADED CONNECTORS (L-R Speaker).** Connect the speakers or the passive crossover speakers system observing polarity.  
**IMPORTANT:** Never connect the -R and -L outputs to ground or to each other. If a crossover filter is used be sure the two channels don't have a common ground. An allen key is provided for the terminal screws.

## MONO CONNECTION

Position MONO push-button to ON. Use IN R input. Take the power output from the +L (LEFT) and -R (RIGHT) terminal.  
It's possible to obtain MONO use just for SUBWOOFER frequencies and to have a STEREO system for high frequencies using the TRIMODE configuration (pict. 1); in this case leave MONO push-button to OFF position and apply the connection system according to the picture. Refer to chart for inductance and capacity values relative to the desired crossover frequency.

## POWER SUPPLY CONNECTION

**THREADED CONNECTORS (Power±).** The battery positive is connected to the + POWER terminal inserting a fuse (provided) next to the battery.  
The - POWER terminal must be connected to the battery negative (ground) through the car body, taking care to assure an excellent electrical contact on a metallic point not covered with paint or insulating materials of any kind.  
For the electrical connections described, use adequate cables, with a minimum diameter of 6 mm (3 A.W.G.). An allen key is provided for the terminal screws.

## TURN ON CONTROL CONNECTION

**THREADED CONNECTORS (Remote in-out).** Connect the amplifier REMOTE IN input to the special radio-cassette player output (REMOTE AUX), or to electric antenna control. The REMOTE OUT output is used to turn on another possible device. A green LED ON indicates when the amplifier is turned on.

## MUTING CONTROL CONNECTION

**THREADED CONNECTORS (Mute in-out).** The MUTE IN input silences the amplifier. The amplifier goes into muting when it receives a positive voltage between 3 VDC and 15 VDC.  
MUTE IN can be connected to the special radio-cassette player output (if provided) or to the MUTE output of a cellular phone; in this case, when there is a phone call, the car system is silenced. When the conversation is over, sound comes back automatically. The MUTE OUT contact of the amplifier must be connected to a second amplifier (if provided) with a special MUTE IN output. In this way the second amplifier becomes dependent on the first one as far as the car system MUTE functions are concerned.

Then there is a complementary voltage amplifier stage in SCE-CASCADE (Saturated Collector Emitter Cascade) configuration and realised with BJT transistors. These circuits have been duly polarised and configured as transconductance modulators (HCP - HCN Hyperlinear correction) with filter functions for transient distortions.

The electrical features of the TOMAHAWK section are: THD distortion at 100 Vpp: 0.04%; Slew Rate: 125 V/µS; Baudwidth: DC ÷ 1.5 MHz; S/N: 122 dB. Monotonic decreasing distortion spectrum with stop at the harmonic sixth.

The final stage driven by the above mentioned module is a complementary symmetric inverted triplet configuration and it is supplied with a driver and predriver at low Cob and four + four transistors amplifiers of 150 W, 15 A with Ft of 30 MHz.

The total reaction rate used in this amplifier is of 6 dB and the global performances obtained by the whole amplifier stage are: bandwidth 1.5 Hz÷180 KHz; THD distortion: min. 0.1 % at 160 W; Slew Rate: 60 V/µS.

## POWER SUPPLY

The power supply stage of switching type is composed by a PWM controlled push-pull double power supply. One of them generates and controls only positive voltages, the other one the negative voltages. The power supply system functioning logic is directed by a single circuit, called PWM CONTROLLER, which also attends to the PWM generation in the positive power supply and operates in a synchronic way with a second circuit called PWM SERVEUR, which has the task of making the PWM control of the negative power supply. Synchronism between the two PWM generator clocks avoids the formation of residual products at low frequency which could be converted into audio disturbance noises by the amplifier. The particular dynamic control of the audio amplifier voltages allows the voltage linear levelling and is able to supply energy instantaneously. This control is active up to the frequency of about 800 Hz; the levelling at upper load frequencies is given to the transformer capacities which are equal to 15000 µF. The measurable result of such a complex controlling system is to have a "ripple" on the transformer voltage equal to 300 mV when the HV sedici is loaded at the maximum power on resistive load.

As it regards the sound, the fact that we have a perfectly stabilised power supply voltage for the final stage allows the correct reproduction of high dynamic content transient signals, it guarantees details, acoustic precision and very good reconstruction of sound image.

The power supply delivers three secondary voltages: the first one is for the final power stage at ±40 V, the second one for the internal preamplifier at ±25 V and the third one at ±47 V for the final stage driver circuit.

The power supplies are provided with a primary protection which interdicts their functioning in case of non operative overloading, avoiding circuit damages.

All interactions between power supply and amplifier (secondary voltages control, muting circuits control and reception of information about the final stage protection) are effected through optocoupler circuits.

This solution avoids the transfer of the noises coming from the car electric device to the car radio section.

## TECHNICAL FEATURES

POWER SUPPLY	11±1.5 VDC
IDLING CURRENT	2.6 A
MAX CONSUMPTION (2 ch 4 Ohms)	60 A
NOMINAL POWER CONT. (Tot. + 10%: -5%)	
2 ch x 4 Ohms; 0.3 % THD; 12 VDC	150 + 150 W (RMS)
CONT. OUT POWER (2 ch 4 Ohms; 1% THD; 13.8 VDC)	180 + 180 W (RMS)
CONT. OUT POWER (2 ch 2 Ohms; 1% THD; 13.8 VDC)	345 + 345 W (RMS)
CONT. OUT POWER (2 ch 1 Ohm; 1% THD; 13.8 VDC)	500 + 500 W (RMS)
CONT. OUT POWER (1 ch 4 Ohms; 1% THD; 13.8 VDC)	Bridge 690 W (RMS)
CONT. OUT POWER (1 ch 2 Ohms; 1% THD; 13.8 VDC)	Bridge 1000 W (RMS)
DISTORTION - THD	0.1 %
DISTORTION - IMD	0.08 %
BANDWIDTH	1.5 Hz - 180 KHz
DAMPING FACTOR (4 Ohms)	100
RISE TIME	2.2 µS
SLEW RATE	60 V/µS
S/N RATIO	102 dB
TOTAL NEGATIVE FEEDBACK	6 dB
REMOTE IN	3 ÷ 15 VDC
REMOTE OUT	12 VDC - 150 mA
MUTE IN	GND / 3÷1.5 VDC
MUTE OUT	12 VDC
PRE INPUT SENSITIVITY (unbalanced)	0.2 ÷ 1.0 VRMS
PRE INPUT SENSITIVITY (balanced)	(±0.2 ÷ ±0.5 VRMS)
AMP INPUT SENSITIVITY (unbalanced)	1.0 ÷ 5.0 VRMS
AMP INPUT SENSITIVITY (balanced)	(±0.5 ÷ ±2.5 VRMS)
INPUT IMPEDANCE	10 KOhms
LOAD IMPEDANCE (stereo)	8 - 4 - 2 - 1 Ohm
LOAD IMPEDANCE (bridge)	8 - 4 - 2 Ohms
SIZE BxHxL mm	256 x 57 x 406
SIZE BxHxL inch	10.07 x 2.24 x 1.598

## PRECAUTIONS

- 1) In order for this device to function properly it's important that it be installed in a spot where the temperature doesn't fall below 0°C (32°F) or rise above 55°C (131°F)
- 2) It must be installed in a dry and well ventilated spot.
- 3) The power supply voltage is 12 VCC negative to ground. Make sure that the characteristics of the vehicle electrical system are compatible.
- 4) For safe driving it's advised to listen to music at a volume level that won't drown out external traffic noise.

## INSTALLATION

The HV sedici amplifier is characterized by its relatively compact size considering the performances it offers.

This makes installation possible even in the most unlikely places. For mounting use 6 self-threading screws provided.

**IMPORTANT:** The wooden moulding which protects controls on top of the device must be removed before installing. This is done by loosening the three screws through the 5mm allen key provided. Once the installation is completed and proper settings have been made, replace the protective moulding. For excellent results it's advised to use **Audison cable** products to complete your installation. They include: power cables, signal cables, speaker wires, signal connectors and all accessories needed to complete the wiring.

## INPUTS CONNECTIONS

**PIN ABS CONNECTORS (Inputs).** Observing polarity, connect L-R inputs to respective preamplified outputs of radio-cassette player, preamplifier or electronic crossover. In order to make UNBALANCED signal connections (traditional connection), it's possible to use pin RCA connectors used in almost all electronics on the market. In order to make BALANCED signal connections (taking the signal from a balancer-preamplifier outputs) it's necessary to use ABS signal connectors which you can find in **Audison cable** catalogue. In case of unbalanced connection and in case the radio-cassette player doesn't share the signal GND (preamplified outputs) with the battery GND (chassis of the device itself), the shield of the shielded cable must be connected to the radio-cassette player chassis.

## BALANCED-UNBALANCED CONNECTION

**Balanced:** Position BALANCED-UNBALANCED push-button to BALANCED. For the amplifier inputs use the ABS connectors in Audison cable catalogue taking the preamplified signal from a device provided with balanced outputs.

**Unbalanced:** Position BALANCED-UNBALANCED push-button to UNBALANCED. In the UNBALANCED position device can be used in the unbalanced way (traditional way) and it's therefore possible to employ common Pin RCA signal connectors. For sensitivity values, refer to the technical features chart on the controls area of the device.

## CONNECTION TO EXTERNAL PREAMPLIFIER

Position the PREAMP push-button to OFF position (internal preamplifier exclusion). In this case the amplifier sensitivity decreases and it is necessary to connect the device inputs to an external preamplifier.

The sensitivity can be adjusted from a maximum of 1.0 VRMS to a minimum of 5.0 VRMS in unbalanced configuration (±0.5 VRMS to ±2.5 VRMS balanced).

With the PREAMP push-button to ON position (internal preamplifier on), the sensitivity changes from a maximum of 0.2 VRMS to a minimum of 1.0 VRMS in unbalanced configuration (±0.1 VRMS to ±0.5 VRMS balanced).

The chart on the controls area shows the different sensitivities according to the operative modalities of the amplifier.