300i – 300p

Ultimate 300B amplifiers

Instruction manual

P/N: 2055023151

Table of contents

Security warnings

- Carefully read this manual before installing your new 300i / 300p;
- Should you have any questions on how to set-up or use your amplifier, contact your Nagra dealer;
- AUDIO TECHNOLOGY SWITZERLAND SA declines all responsibility in the event of an accident caused by the non-observance of these instructions or any other form of user negligence;
- Do not attempt to open the unit under any circumstances. Refer any service/repair work to qualified personnel. There are no user serviceable parts inside the amplifier;
- Should you need to ship or transport your amplifier, always use the original packing supplied by Nagra.

Warranty

AUDIO TECHNOLOGY SWITZERLAND SA, certifies that this instrument was thoroughly inspected and tested prior to leaving its factory and is in accordance with the data given in the accompanying measurement protocol and test sheet.

We warrant the products of our own manufacture against any defect arising from faulty manufacture for a period of three years from the date of delivery to the user.

Warranty will be void if the serial number has been removed from the unit.

This limited warranty covers the repair of confirmed defects or, if necessary, the replacement of the faulty parts, excluding all other indemnities.

All freight costs, as well as customs duty and other possible charges, are at the customer's expense.

We decline any responsibility for any and all damages resulting, directly or indirectly, from the use of our products.

We reserve the right to modify the product, and / or the specifications without notice.

Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems).
This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local authority, your household waste disposal service or the shop where you purchased the product.

Congratulations

Congratulations, you have just purchased one of the best 300B amplifiers ever made!

The 300i and 300p were created by an engineering team with more than 60 years of experience designing world-class products for the professional audio, national security and military businesses.

Since its inception in 1951, Nagra builds products that continue to earn a reputation for delivering ultimate sonic performance. Numerous awards have been bestowed upon Nagra for its technical innovation, excellence in design and flawless construction including three Oscars® and one Emmy®.

The Hi-Fi products and field recorders are developed by the same R&D department. Nagra philosophy is to provide innovation and technology in order to design high quality products. The Hi-Fi range was created to implement innovative designs and provide Nagra expertise to a new field.

Thank you for being our customer and enjoy your new 300B amplifier!

Package contents

In addition to the user manual:

- 300i or 300p main unit;
- Transformer block;
- 1 mains cable *;
- VFS vibration free support;
- Set of spare fuses;
- Hex screwdriver (to assemble the transformer block);
- Set of 5 screws (to assemble the transformer block);
- Ceramic screwdriver (to adjust bias);
- Microfiber gloves (from Swiss Haute Horlogerie);
- Measurement protocol, this is the actual electrical measurement of your amplifier;
- For the 300i an RCU-II Nagra remote control with a 9V battery and its screwdriver.

If anything is missing, please contact your dealer.

*depending on your country, the AC mains cable features either bare wires, US, European or Swiss plug.

Setting-up the amplifier

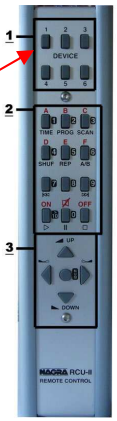
Introduction to set-up

It is recommended to wear Nagra gloves to manipulate the amplifier and the accessories. It is mandatory when handling the 300B tubes as hand prints can affect the tube in the long-term.

Place the amplifier on the **VFS platform** on a perfectly flat and stable surface. Provide enough space above the amplifier to allow air to circulate as the tubes run quite hot.

Remote device number and RC-5

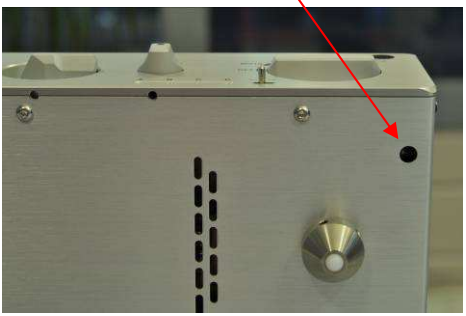
If you wish to change the amplifier device number or if you want to use a RC-5 compatible remote, do so before assembling the amplifier.



By default, the 300i device number is 5. You may change this setting to any number from 1 to 6.

Using Nagra gloves, turn the amplifier upside down and put it on a soft surface.

Remove the plastic protection that hides the access hole to the selector.

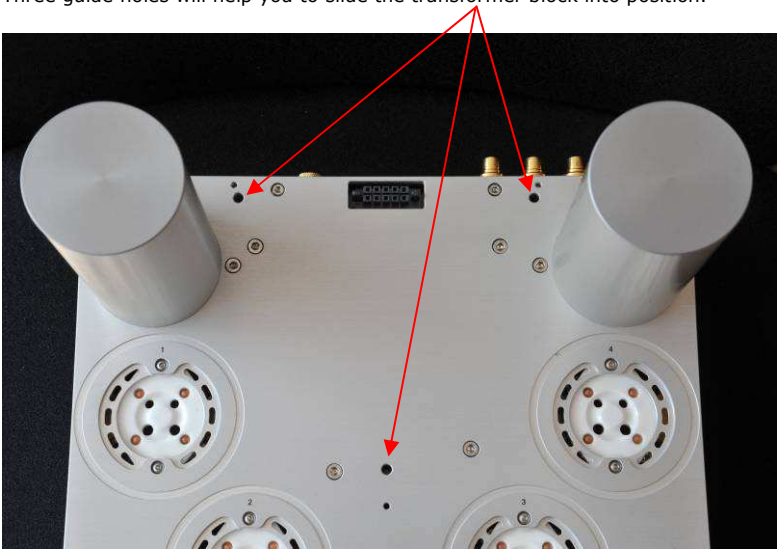


Using the ceramic screwdriver, change the selector to the desired number.

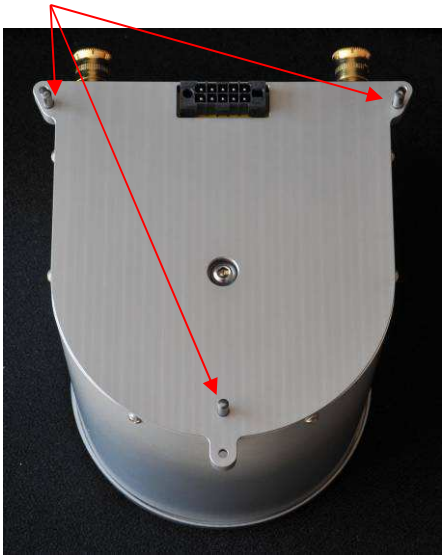
Selector position	**Device**	
0	Code Category Group	Philips RC-5 Preamp Audio 1 16
1 to 6	Nagra device number	

Assembling the amplifier

Three guide holes will help you to slide the transformer block into position.



These short rods fit into the guide holes.

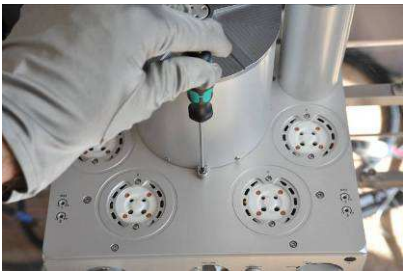


Be careful to place the block vertically above the amplifier's base. Place the rods in the guiding holes and push gently until the block is fully connected.

In this picture you can see the guide rods being inserted into the base.
When reaching the base, the transformer connector will need an extra push to be inserted in the base connector, this is perfectly normal.

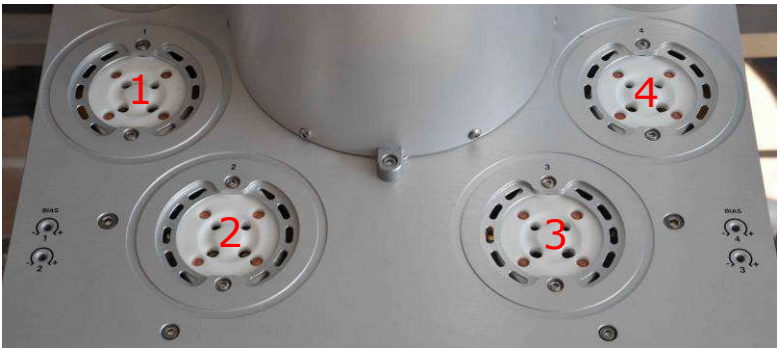
Inserting the block screws

Using the screwdriver provided, place the three fixing screws to hold the transformer in place (the set includes two spare screws).



Installing the tubes

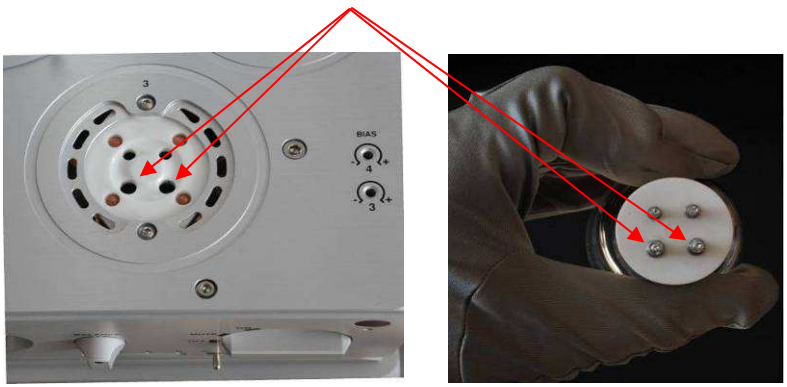
Tubes are numbered from 1 to 4.



On your new amplifier, the Nagra Laboratory has already setup the bias, so be careful to respect the tube placement.
The tube number is written on the back of each tube connector on your amplifier, as well as on the back of each tube base.

Spare tubes provided by Nagra can be placed in any position as you will adjust the amplifier's bias to their specification.

Please note the larger pin position.



Prior to inserting the tubes, make sure the pins are in the right position. Should you have any doubt, remove them and start again.

To insert the tube, hold its base and push down, use the glass part to guide the tube but not to push, as the glass is fragile.

The amplifier features a thermal glass epoxy plate to avoid any miss-insertion.

To remove tubes, pull them by the base and not by the glass part.

Warning: placing the tube in a wrong position can damage the amplifier and thus the warranty will be void.

Place tube protections

The amplifiers are delivered with a set of tube protections made from Pyrex glass (designed to resist the heat).
The protection's base is in iron and will be attracted to the amplifier deck by magnets.

Place the iron part into the gutter.

Tube protections are designed to avoid any contact with the hot tube that could provoke serious injuries. Be careful with the youngest music lovers.

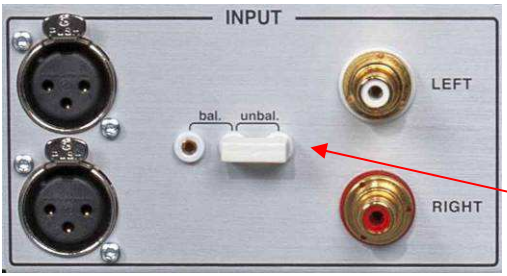
Connections

Your amplifier is now ready to be connected to your system. We recommend doing all the audio connections before plugging the power cable in.

Audio inputs

The 300i features 4 inputs:

A	symmetrical on XLR connector
B & C	Asymmetrical on RCA (CINCH), 2 V rms max.
D	Asymmetrical on RCA (CINCH), 4 V rms max.



On this picture, the input is on RCA.

The 300p features a choice of symmetrical on XLR or asymmetrical on RCA (CINCH).

Its maximum input level is 2 V rms.

Use the white jumper to select XLR or RCA input.

Loudspeaker output

The output transformers provide different output windings to perfectly match with your loudspeaker impedance.

You may check your speaker specifications to know their impedance; you might as well use the provided « Load match meter », please read the chapter **Load match meter** on page 19.

The speaker's binding posts can accommodate a choice of bare wires up to 4.2 mm, 4mm banana plugs or 6.35mm spade lugs.

Mains power connection

You may now connect your power cable to the IEC plug, just below the mains switch.

Ground post

Your Nagra dealer may advice you on the opportunity to use the ground post. It is only useful in very specific situations.

Operating the amplifier

Front panel

1. 2. 3. 4. 5. 6. 7. 8. 9.

1. VFS platform
2. LED (light emitting diode) and modulometer intensity adjustment
3. Modulometer
4. Modulometer function selector
5. Volume potentiometer
6. Fine left / right level balance
7. Input selection (display on LED A to D)
8. Main selector
9. Remote control receiver and remote LED

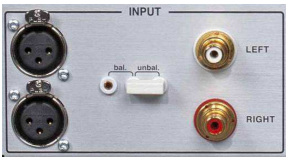
The 300p front panel is the same except for the preamplifier functions (input selector, volume and balance).

Rear panel

1. Inputs
   A symmetrical input on XLR connector
   B, C asymmetrical inputs on RCA (CINCH), 2 V rms max
   D, asymmetrical input on RCA (CINCH), 4.1 V rms max

2. Serial number
3. Ground post
4. Power supply voltage indication (120 V on this picture)
5. Mains connector
6. Fuse holder compartment
7. Mains switch (**I**) ON, (**0**) OFF

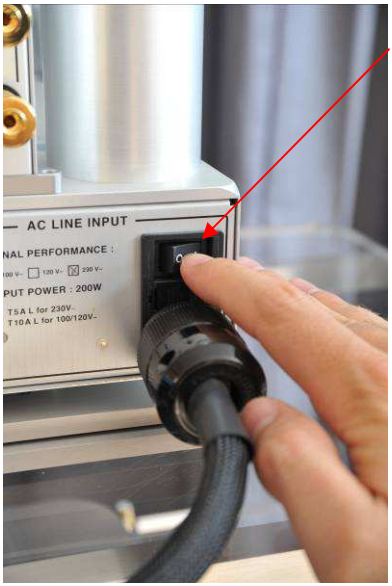
Except for the input block, the 300i and 300p's rear panels are the same.



How to turn the amplifier ON

This page will show you how to turn the amplifier ON and OFF. However, please read the manual throughout, before doing so. It is important to use some caution during the first power on, as you will read in the next section.

The mains switch is located on the amplifier rear panel (**7**). In the **O** position it is completely open and no power is running through the amplifier, power consumption is 0 Watts. In the **I** position, it allows the starting-up board to be powered, the amplifier is in a stand-by position, the consumption is then less than 1 Watt.



Before powering on the amplifier, make sure the volume is down to the minimum.

To start-up the amplifier, use the main selector located on the front panel (**8**).

It is recommended to first put the selector to **MUTE** and after a few seconds to **ON**.

The amplifier needs to warm-up during about fifteen minutes before reaching its nominal working zone.

You may however start listening as soon as the amplifier is on.

Caution to use for the first power on

Even with brand new tubes the bias setting can move, because of transport for instance. If the bias has dramatically moved, then the amplifier might place itself in a "protection mode" to avoid any damage to the tube or the amplifier. For further details about this mode, please read the "**Troubleshooting**" section on page 21.

Before going further, please read the **Bias adjustment** section on page 23.

For the amplifier's first power on:

Put the mains switch on position **I** (on the rear panel)
Place the main selector (**8**) on **MUTE**

The amplifier is working fine	The amplifier shuts down and **C** LED is blinking
Turn the main selector to **ON** and enjoy your favorite records	It means that one or several tube bias are wrong Put the main selector (**8**) to **OFF** Put the main selector (**8**) to **ON**, then put the modulometer selector to 1-2 and 3-4 to identify the tube that has a bias problem Turn the tube bias potentiometer to move it closer to the green area, don't try to fine tune it, just to get it out of trouble Once the 4 tube's bias are closer to the green area, wait another 15 minutes to fine adjust the bias

NB Should the amplifier be turned ON and OFF more than 4 times during the bias adjustment, it will change its start-up time to 2 minutes, the RC LED will blink during these 2 minutes. This waiting might seem long, but is necessary to protect some components that endure a lot of stress during start-up phase. It is best to learn to adjust the bias fast to avoid multiple start-ups.

How often to adjust the bias

It is recommended to control the bias once a month if you use the amplifier every day. Let the amplifier warm-up around 15 minutes, then if needed adjust the bias.

Should the bias be difficult to adjust or move very often, this is a sign of a tube fault or wearing, in these cases, contact your Nagra dealer.

If you feel that your amplifier is less powerful or if the level of distortion has increased, this is a sign of tube aging, you should consider changing them.

Installing new tubes

Turn the amplifier **OFF** using the mains switch on the rear panel, place the new tubes by pair 1-2 and 3-4, please use Nagra gloves to manipulate the tubes. Then, carefully read the section "**Bias adjustment**" on page 23.

Before turning the amplifier **ON** to adjust the bias, place the bias potentiometer in their middle position. To do so, turn fully clockwise, than fully counter-clockwise and try to find the middle of this circle.

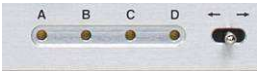
Then follow the steps defined in « **Bias adjustment** ».

Adjusting backlight and LED intensity

There are 7 levels of intensity for the modulometer backlight and the LED.

Pushing the (**2**) switch down (cloud) will decrease intensity down to extinction; pushing in the opposite direction (sun) will increase intensity.

Input selection

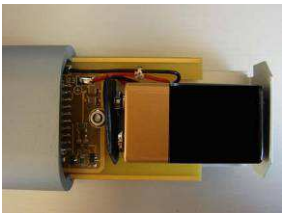


Input selection is made through the horizontal toggle switch (**7**). Each left or right push will change the input. Here from **C** to **B**.

Inputs A, B and C accept signals up to 2 V rms. Input D allows signals up to 4.1 V rms, prefer this input if you use high level sources.

How to use Nagra remote control (with 300i only)

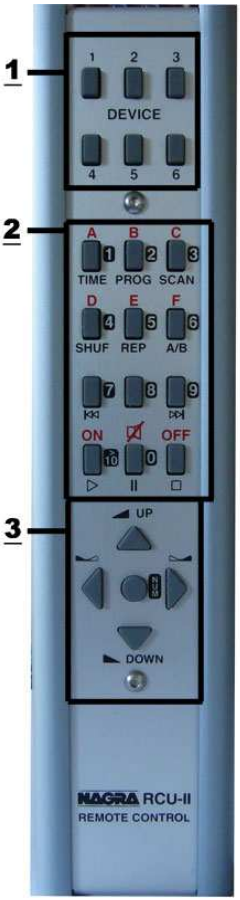
The RCU-II remote control requires a 9 V battery.



We recommend using alkaline batteries for extended battery life.

Hold the remote control upside down. Remove the screw (screwdriver number 3 provided). Slide the battery compartment off, install the battery, slide the compartment back on and replace the screw.

Remove the battery at the end of its useful life or if the remote control is not used for a prolonged period. Batteries contain chemical substances and must be disposed of appropriately.



Block 1

Your RCU-II remote allows you to control several Nagra units. Each unit has its own device, numbered from 1 to 6.
By default, these numbers are:

Device	**Unit**
1	PL-L
2 & 3	DAC
4	CDC & CDP
5	300i

Block 2

The 300i uses the function written in RED
A, B, C, D input selection

Will mute the input, the LED below the MUTE position on the main selector (**7**) will light up

ON allows you to exit the « MUTE » mode

OFF is not used on the 300i

Block 3

UP	increases volume level
DOWN	decreases volume level

Increases left channel level

Increases right channel level

The centre  key is not used on the 300i.

Load match meter

To further optimize the matching of your speakers with the amplifier, you may use the built-in load match meter.

While listening to music, place the modulometer function selector into the **M-L** (left channel) or **M-R** (right channel) position.

The needles will then indicate

Needle	**Indication**
Black	Represents anode current
Red	Represents anode voltage

You might select a piece of music that represents the typical style you listen to often. Play this tune (repeat it if necessary) and observe the needles.

Good match	Needles are following each other with little difference (as shown on the picture)	The impedance choice is optimal
Poor match	Needles movements seem to not relate to each other, specially on bass notes (bass drum for instance)	Try another ouptut impedance on the amplifier and adjust it until it is better

Reading the modulometer

In the « LEVEL » position on the modulometer selector, the meter indidates the amplifier's output power in Watts. The logarithic deviation allows for a convenient reading, specially at low level. The scale goes from 0 to 20 Watts.
Very often, you will see that the power is quite low, from a couple of tenths to a Watt.

The amplifier can play up to 20 Watt and support high level peaks without problems. However if the needle is continously at the 20 Watt position, the distortion will increase significantly.

Case cleaning

Clean the amplifier casing using a soft, non-fluffy, slightly damp cloth. Do not use any cleaning products which could have a corrosive effect. Do not expose the amplifier, batteries and accessories to humidity, rain or excessive heat (from domestic heating or direct sunlight).

Annex 1 - Troubleshooting

In the event of a problem, the amplifier will place itself into the **protection mode**. In this situation, the tubes will shut down and a LED will blink on the front panel to report a specific problem.

In any case, do not attempt to open the amplifier or the transformer block. If you have any doubt on what to do, contact your Nagra dealer for support.

Problem	300i alarm	Solution
The amplifier does not start		Is the mains cable correctly inserted? Is the fuse OK? Make sure the mains switch (**7**) is on **I**
The amplifier works, but the sound is distorted		Check your source maximum output level. If it is greater than 2 V rms, use input D If it is greater than 4.1 V rms, check the source's instruction manual to lower the output level to 2 or 4 V rms You may also use external attenuator as a last solution
The amplifier does not start	A LED blinks	Mains voltage is not right for your amplifier, contact your dealer
The amplifier does not start	B LED blinks	The output block transformer is not correctly inserted or the casing is open. Switch off the mains switch on the rear panel (**O**) and make sure the transformer is in the right position. If the LED still blinks, contact your dealer
The amplifier starts, but shuts down after 15 seconds	C LED blinks	One (or more) tube(s) are faulty or not connected, or their bias is not correctly set. Read the **Bias setting** on page 23
The amplifier starts, but shuts down after 15 seconds	C LED blinks and on match meter L or R, the RED needle points to zero	Your dealer has to inspect the unit and perform a specific maintenance operation he is trained for
The amplifier does not start	RC LED blinks (**9**)	This will occur after 4 consecutives start-ups in a short time, often during bias adjustment Turn the amplifier on again, it will start after a 2 minute warm-up during which the LED will keep blinking

Troubleshooting on the 300p

The troubleshooting is the same as on the 300i, except that all alarms are indicated on a single LED on the front panel.

Red alarm LED

Problem	300p alarm	Solution
The amplifier does not start		Is the mains cable correctly inserted? Is the fuse OK? Make sure the main selector (**7**) is on **I**
The amplifier works, but the sound is distorted		Check the source output level. If it is greater than 2 V rms, check the source's instruction manual to lower the output level You may also use external attenuator as a last solution
The amplifier does not start	LED on	Mains voltage is not right for your amplifier, contact your dealer
The amplifier does not start	LED blinks slowly (every 2 S)	The output block transformer is not correctly inserted or the casing is open. Switch of the mains switch on the rear panel (**O**) and make sure the transformer is in the right position. If the LED still blinks, contact your dealer
The amplifier starts, but shuts down after 15 seconds	LED blinks very fast (every 0.5 S)	One (or more) tube(s) are faulty or not connected, or their bias is not correctly set. Read the **Bias setting** on page 23
The amplifier starts, but shuts down after 15 seconds	LED blinks very fast (every 0.5 S) and on match meter L or R, the RED needle points to zero	Your dealer has to inspect the unit and perform a specific maintenance operation he is trained for
The amplifier does not start	LED blinks every second	This will occur after 4 consecutives start-ups in a short time, often during bias adjustment Turn the amplifier on again, it will start after a 2 minute warm-up during which the LED will keep blinking

Annex 2 - Bias setting

Setting the bias means changing the grid voltage, thus determining the amplifiers operating point (in fact the anode current). It is especially important in a push-pull amplifier to precisely match the current in both tubes.

This adjustment is made fairly easy thanks to the modulometer that is a high precision measurement tool.

While heating-up, the tube bias might change a little, this is perfectly normal. You should start by doing a rough setting, and **after 15 minutes, make a fine adjustment**.

While adjusting the bias, the amplifier might place itself into the **protection mode**, the **C** LED will start blinking. This is normal, you just turn the amplifier **OFF** and **ON** again using the main selector (**8**), then pursue the adjustment.

Step 1 Turn the amplifier on using the main switch on the rear panel (**I** position), put the front main selector on **MUTE**

Step 2 Check the bias on the modulometer's needles

Place the modulometer selector on 1-2, and 3-4.

Step 3 Adjust the bias

Use the provided ceramic screwdriver, it has the advantage of being electrically isolated.

The bias is made by means of precision potentiometers built-in the amplifier's main deck.

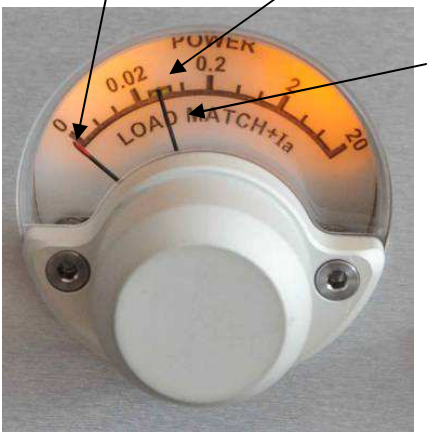
Tubes 1 and 2

Tubes 3 and 4

Step 4 go green!
The centre of the green area on the meter scale is the optimal position the needles should reach.

The needle position on this picture shows a perfect bias

RED needle tube 2 Green area



BLACK needle tube 1

Needle	Tube
Black	1 or 3
Red	2 or 4

NB on this picture the red needle (tube 2) is far from the green area and much too low. The amplifier will go into the **protection mode** if you fail to bring the needle closer to the green area within 15 seconds from start-up. If the amplifier shuts down, you can still move the potentiometer before restarting it.

Step 5 potentiometer direction

Clockwise – needle moves to the right

Anti-clockwise – needle moves to the left

Annex 3 - Replacing the fuse

To remove the fuse compartment from the amplifier, use the provided ceramic screwdriver to unlock the fuse holder.

Insert a fuse in the fuse holder on the metal contact side. You may place a spare fuse in the left compartment.

Always use Nagra original fuse or some of the same type (5x20), depending on the mains voltage, the fuse should be:

Mains voltage	**Type** 5x20
100 / 115 V	2 A – 120 V
230 V	2 A – 230 V

Place the fuse holder in its compartment; make sure the metal connectors are on the right hand side. Push until you hear a click.

100, 115 or 230 V power supplies are optimized to work with a specific mains voltage.
Only Nagra factory can change the amplifier's voltage range.

Technical specifications

The following table shows the general specifications for all Nagra 300i and 300p amplifiers. Your personal amplifier's measurements are provided on the accompanying "measurement protocol" document.

Type	Class A	
Tube type	300B triode	
Output power	20 W rms	
Input impedance	> 48 k Ohm	
Inputs	3 RCA, 1 XLR on 300i 1 RCA or 1 XLR on 300p	Selection by jumper on 300p
Frequency response	14 Hz – 45 kHz	+0 / -3dB
Signal-to-noise ratio	105 dB	ASA A
Total harmonic distortion (THD)	0.8 %	At full power
Crosstalk	> 70 dB	10 kHz
Inputs	2 V rms inputs A, B and C 4 V rms inputs D	300p, 2 V rms on RCA and on XLR
Outputs	Gold plated WBT	Bare wires up to 4.2 mm 4mm banana plugs 6.35mm spade lugs
Voltage range	90 - 132 V or 180 -264 V	50 – 60 Hz
Power consumption	120 W continuous	< 1 W in stand-by
Dimensions	277x275x232 mm	10.9x10.8x9.1 inches
Net weight	14 Kg	31 lbs
VFS weight	2.5 Kg	5.5 lbs

DECLARATION DE CONFORMITE
DECLARATION OF CONFORMITY

FABRICANT: AUDIO TECHNOLOGY SWITZERLAND SA,
1032 Romanel, SUISSE
MANUFACTURER: *AUDIO TECHNOLOGY SWITZERLAND SA,*
1032 Romanel, SWITZERLAND

APPAREIL : Nagra 300i / Nagra 300p
MODEL: *Nagra 300i / Nagra 300p*

NORMES APPLICABLES :
APPLICABLE NORMS:
Champ électromagnétique rayonné EN 55022 Cl. B
Radiated electromagnetic field EN 55022 Cl. B
Perturbations conduites sur secteur EN 55022 Cl. B
Disturbance voltage on mains terminal EN 55022 Cl. B
Immunité aux champs électromagnétiques EN 61000-4-3
Immunity to electromagnetic fields EN 61000-4-3
Immunité aux décharges électrostatiques EN 61000-4-2
Immunity to electrostatic discharges EN 61000-4-2
Immunité aux transitoires électriques
rapides en salves sur câble d'alimentation EN 61000-4-4 level 2 (1000V)
Immunity to burst on mains line EN 61000-4-4 level 2 (1000V)
Immunité aux aux transitoires électriques
rapides en salves sur câbles d'entrées/sorties
signaux EN 61000-4-4 level 1 (500V)
Immunity to burst on input/output signal line EN 61000-4-4 level 1 (500V)
Immunité aux ondes de choc EN 61000-4-5 level 2 (1000V)
Immunity to surge EN 61000-4-5 level 2 (1000V)

Cheseaux 4ème trimestre 2010
Cheseaux 4rd quarter 2010

Nagra R&D team