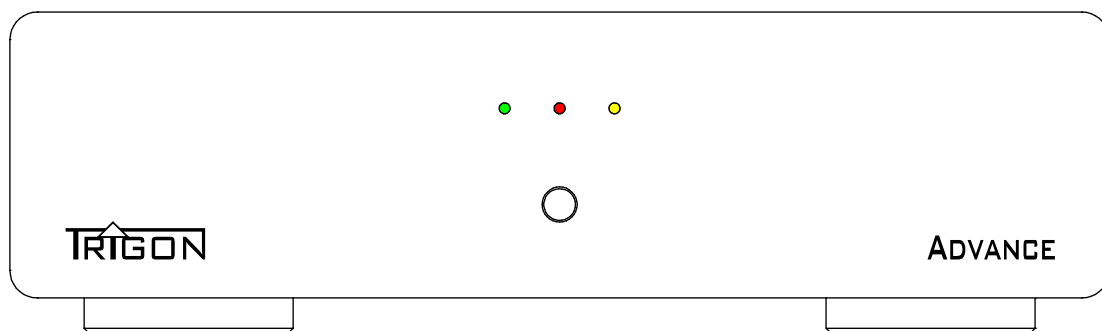




OPERATING INSTRUCTIONS
FOR PHONO AMPLIFIER

Advance



Analogic

Even more than two decades ago, so the propagandists of the new medium Compact Disc wanted it, the record had retired. The number of sold records removed from year to year, those of the CD's increased, until apparently now eternally of yesterday ones and the nostalgic people at unexplainable expenditure maintained and supplemented their record collections and had still no CD player. Yes, in addition maintained they their record player makes more music... and harvested a pitiful smile.

But parallel to this development remarkable happens - and the smiled at record lover and convinced analogue fan formulated not without sneers:

"The claiming already in the year 1980 perfect CD player is constantly improved and to the yardstick of this striving the music rendition becomes similar good analogue record player but not only this. At public demonstrations once CDs were thrown in the surprised public for the demonstration of the insensitivity by Compact Discs then today the realization made itself broad that they want to be treated just as carefully as records, even more, demagnetised, frozen, painted or ground and with coatings provides to sound only correct to be supposed. A similarity or an agreement with living disk washing machines, pucks, disk platelayers and needle cleaners is purely coincidental and not intended.

If the first CD Player made music apparently still in each situation in life and on each underground perfectly, then its descendants received beside constantly improved digital/analogue transducers always more complex housings, damping and, a beggar who thinks bad thereby, sub chassis drives or belt drives.

Almost exorbitantly expensive CD drive assemblies with separate digital/analogue transducers recruit for itself with the statement, now, finally, in such a way to sound like the best record players. But the uneasiness, which in-crept in things CD in the course of the years, seems remained. New digital formats, like SACD and DVD, urge on the market and are to now reach, what was already promised twenty years ago: "SACD has a transmission range as large up to 64 times as the CD. Thus results a refinement of the signal, which corresponds to analogue technique. (dpa/dwe, 14.11.2001)

We consider the evaluation of memory procedures, which work with data reduction, before this background simply renounce able. Rational at this newest stage of the development of digital music storage media, which increases not the transmission range, but the scanning rate, is the insight that people had underestimated substantially the quantity and quality of musical information from the record groove, once again the new wasn't even the. In the age of the permanent announcement of technical sensations and revolutions we form an analogy: High End Audio won't invent each month again. Persistent, consistent advancement and innovation in smaller and larger steps, which is relevant before the introduction on the market, define High End for us at the last state of things.

What now? Sell all CDs as once unfortunately, the record collection? Perhaps the view continues to help that tone carriers and their artful packing are more than only technical, exchangeable canned goods. The speech is about cultural properties and time documents, which are not to be excluded straight from the individual Biography. In this regard the record already furnished the proof of their, also technical, longevity as canned goods, that of the CD isn't done yet. There it is nevertheless reassuring that in the year 2001 the number of the sold records doubled itself to more than in relation to the previous year. (dpa/dwe, 14.11.2001).

The latter makes at the same time hope for a further creative next to each other, which we, apart from the conservative aspect, agree with. Because like the attempt of the CD to be finally records heir had lead to ever better CD-players, without which already in view of the existing software only few can to do and want seriously, then the competition of the new medium has the similar record rendering again accelerated and on, at the gloss times of the old tone carrier,

a probably non-existing level elevated. Never before there were as good drive assemblies, tone arms and pick-up systems as today. Oh, and phono amplifiers with which we would be finite with the topic.

How little has to do the complex task of an equalizer pre amplifier with pure opinion, you'll be told in the next chapter. Who doesn't want to know it so exactly first, may skip this chapter, but only this, to find out, how the Advance wants to be up and adjusted, attached, served and treated, thereby it can help to transform the high-quality, but sensitive phono signals of your records in the best possible way into music and to thank you itself in our name for your investment.

Little phono technology and technical description of the Advance

With the Advance concerns it a phono pre amplifier for the equalization and reinforcement of signal voltage coming from a record player.

Signal voltage coming from a pick-up system is unfortunately not as with CD-players or other audio devices over the shown frequency range linear, but contained with 20 cycles per second approx. 1000 time smaller signal than with 20 kHz. Without equalization the music would therefore sound itself extremely full of high tones.

The task of the phono amplifier or better said the equalizer pre amplifier is it now to produce a linear audio signal from this bent rendition characteristic, i.e. with all shown frequencies equivalent loud.

Thus however not enough, the signals of the pick-up systems are also still very weak (or quietly), so that a relatively high reinforcement is needed to raise the audio signal to the level, which is usually available with all other audio sources (except microphones). With MC pick-ups the task of the equalizer pre amplifier is more fastidious, because the output voltage of these systems is usually lower even again around the factor 10 (i.e. 20dB) than with MM pick-ups.

Furthermore the different pick-up systems need also another appropriate feed impedance, which can be adapted individually for each pick-up, to be able to unfold their qualities complete.

The demands, which are made against a phono amplifier, therefore are:

- 1. Exact equalization of the input signal**
- 2. High, adjustable reinforcement**
- 3. Individual adjustment of the feed impedance**

The first task, **exact equalization of the input signal**, can be mastered only if you use highly exact construction units in the equalizer part of the phono amplifier. Therefore we measure each construction unit for this stage with highly precise measuring instruments. The values of the assigned construction units are selected here on a deviation from less than 1%! Identical pairs of construction units are always formed for the two stereo channels, to exclude channel inequalities. In this way the Advance produces an almost perfectly linear output voltage.

The second task, **high, adjustable reinforcement**, represents a problem of completely different kind. High reinforcement of the information signal means at the same time also high reinforcement of spurious signals. The main spurious signal is thereby the noise. This problem can be solved only satisfyingly with very efficient and at the same time low-noise amplifier stages. In the Advance we use highly exact operation amplifiers, which besides exhibit extremely small distortion values.

The other spurious signal, which leads to problems in phono amplifiers again and again, is the so-called humming. This humming has usually three causes: Stray effect through nearby mains transformers, careless supply voltage and incorrect printed circuit board design.

Over to avoid the stray effects by the mains transformer the power pack of the Advance is accommodated in a separate housing and so it can be set up in some distance to the set.

A special power pack circuit supplies the sensitive amplifier circuit with filtered direct current. In order to however completely exclude net influences, is besides a lead gel accumulator inserted, which (alternatively switch able) supplies the Advance also without power pack support with (principle-caused) really clean direct current.

The printed circuit board design is characterised among other things by a special star shaped arrangement of the pig pus courses, so that humming signals cannot disturb the sensitive amplifier stages.

The reinforcement can be adjusted individually in 16 stages by small mini switches, which are attached on the lower surface of the set. With the help of that table indicated far down you could make the correct attitude for the respective pick-up system there.

The third task, **individual adjustment of the feed impedance**, can be settled with the Advance by a mini switch on the lower surface of the set. Here are six different adjustment resistances and this means 64 combinations are for the adjustment of one MC pick-up and 2 capacities, so there are four combinations for the adjustment of a MM pick-up at the disposal. Information about all combinations gives a table indicated far down.

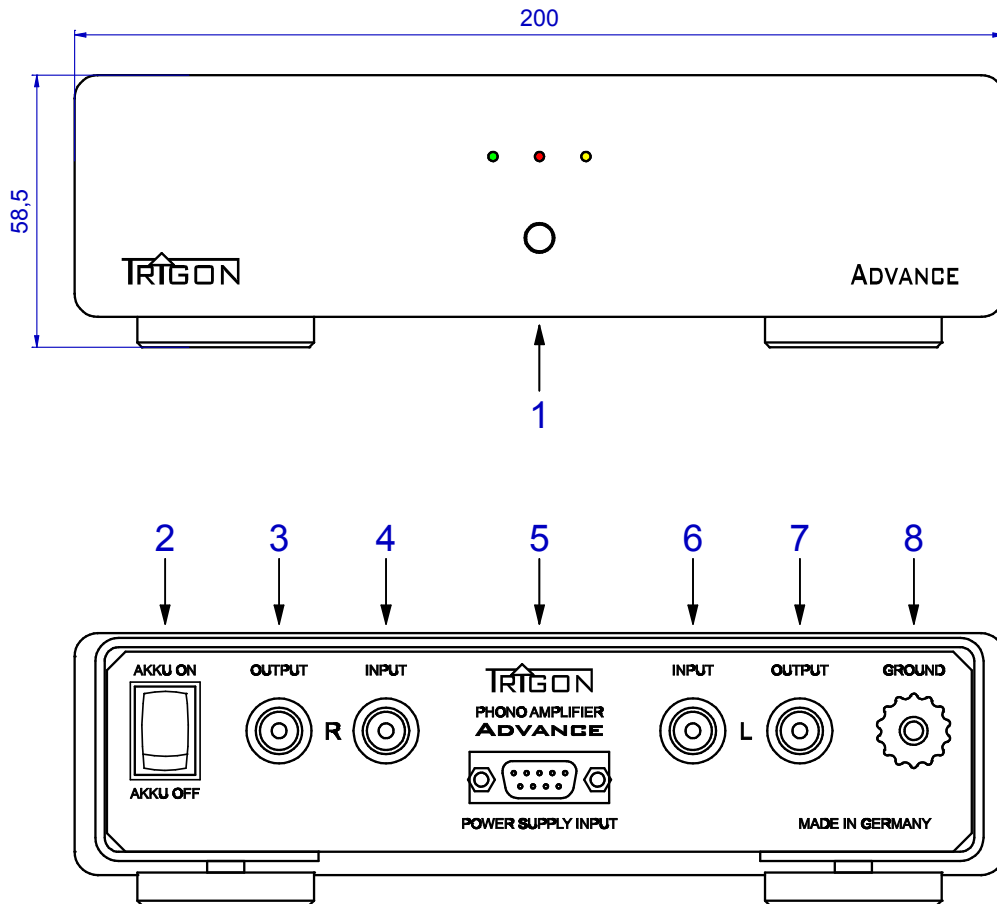
You recognize already by the larger number of possibilities of adaptation of a MC pick-up that the Advance treats MC pick-ups preferentially. The reason lies in the fact that the majority of the offered High-end pick-up systems are nowadays of the type MC.

If the case should arise that no suitable combination can be found, then in the inside of the Advance is a plug-in socket for each channel, into which the suitable value can be put. There could be put in a resistance (for MC) or a condenser (for MM) depending on whether type of pick-up. In this way it's ensured that every adjustment can be manufactured which is needed in practice.

Because the Advance is a separate phono amplifier that is connected with the pre- rather full amplifier via link cable, there are also placed high requirements to the output stages of the amplifier. Here we have decided us for an output stage, which makes a sufficiently small output resistance available, so that also cables of more than 2m lengths can be attached. This makes it possible to set up the Advance in direct proximity of the record player and to keep so the cable length between record players and Advance very small. This is of importance, because short cables can to minimize transducer losses and offer at the same time external influences less attack region, so that the anyway very susceptible, low signal of the pick-up is impaired as little as possible.

The operation and wiring

The following picture shows front and back of the Advance.



1. Operating key and control lamps

With the tracer (1) the Advance can be switched on and off, but in addition it can be switched between the two operating modes, pure accumulator mode or combined accumulator - line operation.

A short depressing the key switches the Advance on. Each further short depressing the key switches between the operating modes. To switch off the Advance, the key must be kept pressed approx. 2 seconds. The operating conditions are indicated in each case by the light emitting diodes over the tracer.

The control lamps signal thereby the following conditions:

No LED shines for - The set is out. The power pack supplied however the charger automatic controller for the accumulators and the accumulators are loaded.

The red LED shines for - The set is switched on and works in the combined accumulator - line operation. If the Advance is switched on, flashes the red LED several times before it constantly lights up and the signal at the exit is connected through. If no power pack is attached, then the green LED flashes and the set starts in the pure accumulator mode.

The red and the yellow LED shine for - The set runs in the combined accumulator - line operation and the yellow LED signalled additionally that the accumulator is fully loaded.

The green LED shines for - The set runs in pure accumulator mode. The power pack supplies only control electronics and the announcement LED's. If the accumulator is fully loaded, you can hear music in pure accumulator mode for approx. 6 hours.

If the power pack is separated from electricity mains in the pure accumulator mode, then the accumulator must supply the control electronics and the announcement LED's, too, which leads to a reduction of time of operation in this mode. Therefore leave the power pack always at the net.

The green LED flashes - The accumulator is now so far unloaded that it should be loaded now again. Please switch back again to the combined accumulator - line operation, by pressing the key 1 once briefly.

The red and the green LED shine for – You switched from the pure accumulator mode to the combined accumulator - line operation, but the separate power pack is not put in or connected with the lighting system.

As soon as you connect the power pack again duly with the Advance rather insert the mains plug into the wall socket, the green LED switches off and only the red LED shines alone, i.e. it is restarted the combined enterprise.

2. Accumulator switch

With this key it is possible to separate the accumulator electrically from the set. This function is important, if the Advance isn't to be operated at electricity mains for longer time, e.g. during transport or during the vacation period. Thus is avoiding an inadmissible over-discharging of the accumulators.

Importantly!!! If the Advance were connected neither at the mains nor with the accumulator (accumulator key was switched to OFF without attached power pack), then the separate power pack must with renewed start-up at least for some seconds for river supply the Advance, so that the set can be switched on. From this the accumulator key must be switched naturally to ON. If the accumulator was fully loaded, there isn't an obstacle for you to enjoy now approx. 6 hours pure accumulator mode. Although we do not recommend it, it is now again possible to separate the power pack from the mains. However, the run of the accumulator shortens accordingly, because now the control electronics and the LED's are supplied with river by the accumulator.

3. Line Out - right channel

The output signal of the right channel rests at this socket. Connect this exit with a high level or a line entrance of your pre/full amplifier. Frequently such entrances are designated with AUX. In addition, the CD- or TAPE- entrance of the pre/full amplifier can be used usually.

4. Line In - right channel

At this socket the right channel of the record player (pick-up) is attached. With the mini switches at the ground the feed impedance can be indicated adjusted, like in the table 1.

5. Power pack entrance socket

To this socket the ground power pack belonging to the scope of supply is attached. Therefore you use the likewise cable connection which is attached.

Make first the connection between power pack and Advance, before you connect the power pack with the lighting system. Thus it is guaranteed that it comes to no inadvertent short-circuits at the exit of the power pack. If the accumulator key (2) should stand still on OFF, switch it now to ON please.

Consider please! - The mains cable has a 9-ending D-sub-plug on both sides like they are to be found in the computer engineering frequently, too. Make sure however that you never operate this cable with and at a computer. Never connect the power pack or the Advance with the computer by this socket because then both sets will take damage.

6. Line In- left channel

It applies the same as described under 4, only to the left channel.

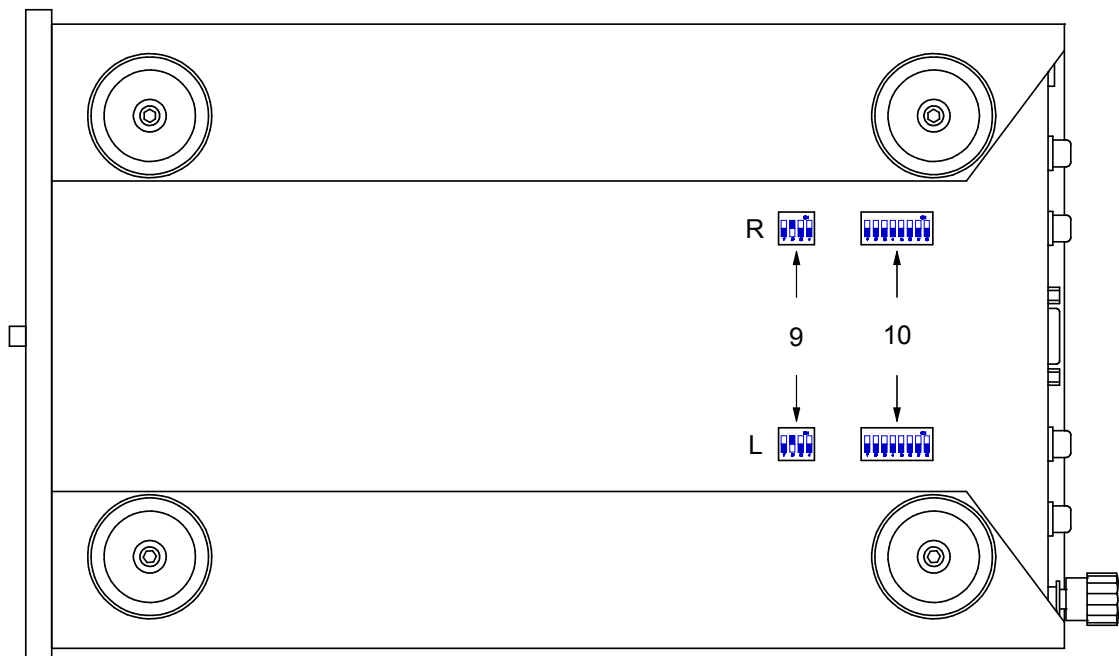
7. Line Out - left channel

It applies the same as described under 3, only to the left channel.

8. Ground (ground terminal)

At this clamp the grounding- rather earth-cable, which is usually led out separately at record players, is attached. In most cases is at these grounding electrodes a fork-putting shoe. To be able to attach this fork, you untwist the knurled thumbscrew of the ground terminal a little and wedge then the fork through closing the knurled thumbscrew. Simple stripped cable ends can be also attached by solving, after that they were put into the lateral drilling of the knurled thumbscrew and then likewise again with the knurled thumbscrew clamped.

View of the ground with the mini switches for the reinforcement (9) and the feed impedance adjustment (10)



9. Mini switch for the gain setting

With these switches for each channel the reinforcement is adjusted separately. For the attitude you use the following table as guideline assistance.

Table of the switching positions for the gain setting

With the four-fold mini switch for each stereo channel on the lower surface of the Advance the reinforcement can be adjusted separated.

As this table shows, the reinforcement between 35,7 dB and 60,2 dB can be adjusted in 16 stages.

S4	S3	S2	S1	Reinforcement in dB	For systems with The following Output voltages
0	0	0	0	35.7	8mV
0	0	0	1	41.5	4mV
0	0	1	0	45.3	2.7mV
0	0	1	1	47.6	2mV
0	1	0	0	48.8	1.8mV
0	1	0	1	50.4	1.5mV
0	1	1	0	51.9	1.2mV
0	1	1	1	53.2	1.1mV
1	0	0	0	56.0	0.8mV
1	0	0	1	56.8	0.7mV
1	0	1	0	57.6	0.64mV
1	0	1	1	58.2	0.59mV
1	1	0	0	58.6	0.58mV
1	1	0	1	59.1	0.54mV
1	1	1	0	59.8	0.51mV
1	1	1	1	60.2	0.5mV

If you do not find the exact value of the output voltage of your pick-up in this table, you could select the value, which comes next to your pick-up.

You reach in each case with the in the preceding table given attitudes a DIN-Output voltage of 500 mV. It's depended from the entrance sensitivity and reinforcement of your pre or full amplifier you need often only a clearly smaller output voltage to achieve the desired hearing volume. You should experiment in this regard because a lower reinforcement can be tonal more favourable.

Louder systems (output voltage more largely 8 mV) can be naturally also attached, however thereby the over-regulation reserve is reduced, i.e. it can come to the over-regulation of the amplifier, which expresses itself by higher distortions.

Quieter pick-ups (output voltage of small 0.5 mV) can be operated accordingly problem-free.

Frequently, pick-up manufacturer indicates the output voltage of their systems in the e.g. following way.

Output voltage = 2.5 mV with 4.36 cm/s

The standardized output voltage refers usually however to a reference fast of 5.6 cm/s. In our case therefore the output voltage results to:

$$\text{Output voltage} = \frac{2.5\text{mV}}{4.36\text{cm/s}} * 5.6\text{cm/s}$$

Thus results an output voltage of approx. 3.2 mV, i.e. you should set switch 1 with the mini switches for the reinforcement to ON.

10. Mini switch for the feed impedance

These switches are adjusted separately for each channel the feed impedance. For the attitude you use the following tables 1.1 and 1.2 as guideline assistance.

Table 1.1 of the switching positions for the entrance capacity

Adjustment capacities can be connected to magnetic systems by depressing the switches S1 and S2. S3 to S8 are switched off with MM systems, since MM systems are usually operated at input impedance by 47KOhm.

S1	S2	S3	S4	S5	S6	S7	S8	Entrance capacity	Input impedance in ohm
0	1	0	0	0	0	0	0	47pF	47000,0
1	0	0	0	0	0	0	0	100pF	47000,0
1	1	0	0	0	0	0	0	147pF	47000,0

The entrance capacity without connected capacity amounts to approx. 60 - 100pF with the Advance.

Each capacity, which is connected, must be added to this entrance capacity. The cable capacitance of the cable connections between record players and preamplifiers must be added, too. Furthermore the cable capacitance of the cable in the tone arm pipe adds itself. In this way do values of more than 200pF - 300pF often already come without auxiliary capacities.

To be noted it should, however, that deviations by the pick-up manufacturer recommended of the adjustment capacity, in the order of magnitude of 20 - 30 % are acceptable, since during the production of pick-ups frequently similar tolerances develop.

Table 1.2 of the switching positions for the input impedances

100p S1	47p S2	1800 S3	1000 S4	470 S5	220 S6	100 S7	47 S8..	input impedance computes
0	0	0	0	0	0	0	0	47000,0
0	0	1	0	0	0	0	0	1733,6
0	0	0	1	0	0	0	0	979,2
0	0	1	1	0	0	0	0	634,2
0	0	0	0	1	0	0	0	465,3
0	0	1	0	1	0	0	0	369,8
0	0	0	1	1	0	0	0	317,6
0	0	1	1	1	0	0	0	269,9
0	0	0	0	0	1	0	0	219,0
0	0	1	0	0	1	0	0	195,2
0	0	0	1	0	1	0	0	179,6
0	0	1	1	0	1	0	0	163,3
0	0	0	0	1	1	0	0	149,4
0	0	1	0	1	1	0	0	137,9
0	0	0	1	1	1	0	0	130,0
0	0	1	1	1	1	0	0	121,2
0	0	0	0	0	0	1	0	99,8
0	0	1	0	0	0	1	0	94,5
0	0	0	1	0	0	1	0	90,7
0	0	1	1	0	0	1	0	86,4
0	0	0	0	1	0	1	0	82,3
0	0	1	0	1	0	1	0	78,7
0	0	0	1	1	0	1	0	76,1
0	0	1	1	1	0	1	0	73,0
0	0	0	0	0	1	1	0	68,6
0	0	1	0	0	1	1	0	66,1
0	0	0	1	0	1	1	0	64,2
0	0	1	1	0	1	1	0	62,0
0	0	0	0	1	1	1	0	59,9
0	0	1	0	1	1	1	0	58,0
0	0	0	1	1	1	1	0	56,5
0	0	1	1	1	1	1	0	54,8
0	0	0	0	0	0	0	1	47,0
0	0	1	0	0	0	0	1	45,8
0	0	0	1	0	0	0	1	44,8
0	0	1	1	0	0	0	1	43,8
0	0	0	0	1	0	0	1	42,7
0	0	1	0	1	0	0	1	41,7
0	0	0	1	1	0	0	1	40,9
0	0	1	1	1	0	0	1	40,0
0	0	0	0	0	1	0	1	38,7
0	0	1	0	0	1	0	1	37,9
0	0	0	1	0	1	0	1	37,3
0	0	1	1	0	1	0	1	36,5
0	0	0	0	1	1	0	1	35,8
0	0	1	0	1	1	0	1	35,1
0	0	0	1	1	1	0	1	34,5
0	0	1	1	1	1	0	1	33,9
0	0	0	0	0	0	1	1	32,0
0	0	1	0	0	0	1	1	31,4
0	0	0	1	0	0	1	1	31,0
0	0	1	1	0	0	1	1	30,4
0	0	0	0	1	0	1	1	29,9
0	0	1	0	1	0	1	1	29,4
0	0	0	1	1	0	1	1	29,0
0	0	1	1	1	0	1	1	28,6
0	0	0	0	0	1	1	1	27,9
0	0	1	0	0	1	1	1	27,5
0	0	0	1	0	1	1	1	27,1
0	0	1	1	0	1	1	1	26,7
0	0	0	0	1	1	1	1	26,3
0	0	1	0	1	1	1	1	26,0
0	0	0	1	1	1	1	1	25,7
0	0	1	1	1	1	1	1	25,3

A 1 means: Switch posed on position ON
A 0 means: Switch not switched.

Further terminating impedances

If the inserted adjustment resistances and capacities hasn't the correct value for your pick-up system then the Advance additionally has a plug-in socket, into which a suitable terminal resistance or a load capacitance can be put.

To arrive this plug-in socket the set must be opened. Switch the set off and take off all plugs. Switch off the accumulator with the rocker switch **2**, too, so that the Advance is now completely dead. Now you must unscrew the set feet. Please notice, like the feet are screwed on and respect also that you haven't to lose an individual part. If the set feet are unscrewed, the frame cover can be taken off to the rear. Now the plug-in sockets are accessible, like that is drawn in into the following sketch.

This plug-in socket has 4 contacts each from which the two left rather the two right contacts are connected together.

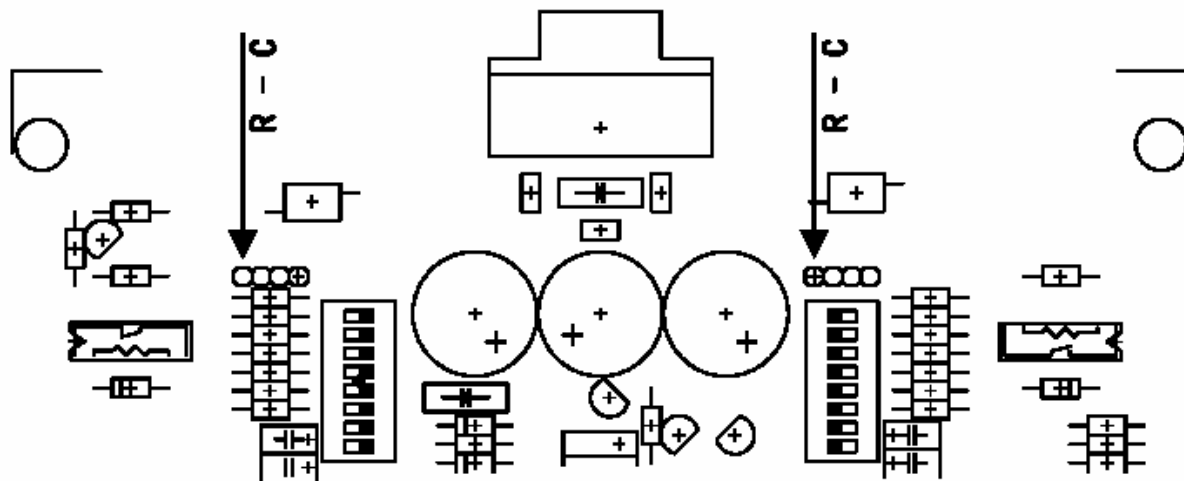
Adjustment resistances are mostly in oblong design available and therefore its will put in into the outside contacts. There are adjustment condensers in different designs (technicians speak here of screen line dimensions). For a condenser with 2.5 screen line dimension please use the two middle contacts.

For a MM-system a condenser (capacity) is usually put in and for the MC-systems you takes a resistance.

Please notice with the selection of the auxiliary capacity that you have to consider the constantly existing entrance capacity of the Advance of approx. 60 - 100pF.

Although this procedure appears a little bit complicated in the first instant, then you are able to settle this work easily, presupposed you care a little. If you like to have it, your specialist dealer will be helpful surely. He could be helpful in the choice and procurement of the adjustment elements that you beyond, too.

Interior opinion. The arrows point to the card locations



In the following example the choice of the correct adjustment value is explained again in detail.

Example:

The MM-pick-up needs according to manufacturer an adjustment capacity of 650pF. Therefore the necessary auxiliary capacity computes itself as follows:

$$\text{Auxiliary capacity} = 650\text{pF} - \text{cable capacity} - \text{entrance capacity}$$

With a cable capacitance of e.g. 200pF and the entrance capacity of the Advance of 100pF you need 350pF for it.

In the Advance you can connected already 150pF by connecting the two inserted auxiliary capacities, so that now still 200pF must be put into the socket to come to the demanded value of 350pF.

An adjustment resistance is usually needed for MC pick-ups. The computation of the additional resistance is quite more complicated and it happens according to the following calculation specification.

$$R_z = \frac{1}{\frac{1}{R_p} - \frac{1}{R_i}}$$

With

R_z = Additional resistance

R_i = 47000 ohms (input impedance, if no resistance switch is switched on)

R_p = recommended input impedance.

Example:

Are according to manufacturer of the pick-up e.g.. 2,5 KOhm (recommended input impedance R_p) demanded, then this value can be reached by an additional resistance (computer centre), which can be put into the plug-in socket. At the same time no impedance-selector-switch may be placed to ON. If you now insert the numbers into the above mentioned formula, then in our case a value of $R_z = 2640$ ohms results.

Like this input impedances can be produced of zero ohm to 47 KOhm.

List recommendations

As is the case for almost all electronic devices the Advance should not be exposed to the direct sunlight, too. Because the set warms up a little when it is in operation, you should pay attention to sufficient circulating air.

A phono amplifier is a set with high signal reinforcement. Unfortunately such sets amplify also any spurious signals. One of these radiated spurious signals is the 50Hz-hum by the transformers. To keep this humming as small as possible, we accommodated the mains transformer of the Advance in a separate housing, so that you can set up this power pack in some distance from the Advance. Of course our efforts are useless if the Advance is placed now on other sets with internal mains transformers.

Therefore you haven't to place the Advance on other HiFi-sets. Pay attention to sufficient distance (at least 50 cm) to other mains transformers.

Particularly transformers of halogen light systems and power-output stages have a strong humming scattering field and should be therefore as far as possible from the Advance. A rule is: The more largely the mains transformers the more largely should be laid out the distance to phono amplifier.

Even mains cables or the net wiring in the wall are breakdown emitters. You receive the best results by sufficient distance to these disturbers. According to our experiences an installation in the direct proximity of the record player is the best solution. So the critical cable connection between record players and Advance can be kept short and spurious signals had only few chances to affect the low pick-up signal. At the same time short signal paths means always-smaller transducer losses, too, in particular with sensitive pick-up signals.

Care references

Never treat the set with a scrubbing means etc. Easy contamination such as dust and finger marks can be wiped off with a fog-damp cloth or sponge. Water-dilute-cash contamination (jam, fruit juices, etc.) could be eliminated with a liquid household cleaner, especially with glass cleaners. Mineral oils as well as animal and vegetable fats are wiped off with white spirits or **Isoprophylalkohol**. Always make sure that no cleaning fluid arrives in the set inside.

The ground power pack you should be cleaned only with a fog-damp clothe or sponge and somewhat with a liquid household cleaner. Please pull the mains plug from the wall socket before cleaning the ground power pack. Make also sure that no cleaning fluid arrives in the power pack inside.

What is if...? Emergency counsellor for possible handling defects

Here we want to try to give you a few Tips, if the Advance wants not so as it has to do.

The Advance cannot be switched on.

The separate power pack isn't connected with the lighting system.
The power pack cable between Advance and the separate power pack is not attached.
The accumulator key **2** is not switched on.

The Advance cannot be switched into the pure accumulator mode.

The accumulator key 2 is not switched on. Switch the accumulator key to ON.
The accumulator is empty. After a load time of approx. 6 hours it would have to work again.

The Advance cannot be served correctly. All LED's are shines.

Pull the plug of the ground power pack from the wall socket and switch off the accumulator key 2, too. The Advance is now without power and a RESET of the control system is implemented. After approx. 1 minute, you put the power supply plug again in and switch the accumulator key to ON.

Despite attention of the list references loud humming is to be heard.

The grounding electrode of the record player is not attached.
In some cases it is possible that no grounding electrode should be attached, because a ground- rather a bonding connection already exists over the signal cable. Only purposeful experimenting helps here. You turn the volume at the pre- rather full amplifier to minimum, if you make a change at the ground connection mass wiring. Thereafter you turn the volume again slowly to maximum and then you evaluate again the result in relation to the previous wiring. Is there no changes rather improvements adjust themselves, you have to contact your dealer.

Technical data:

Amplification:	36 - 60 dB in 16 stages adjustable
Input impedance:	from 25 Ohms to 1800 Ohms in 31 stages; 47Kohm
Capacity:	Basic capacity = 60 - 100pF connectible capacity = 47pF, 100pF, 147pF
Input:	1x Cinch
Output:	1x Cinch
Frequency response:	20HZ – 20kHz + - 0,2 dB RIAA equalized
Distortion factor THD + N:	0.06%
Crosstalk:	<-96.2 dBA
Dimensions H x W x D:	58.5mm x 200mm x 320mm.

Subject to change

Production and construction:

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