

User Manual: CA2 Preamplifier

SCA2 Preamplifier

SIA2-150 Integrated Amplifier

SPA2-150 Power Amplifier

SPA2-200P Power Amplifier

Amplifiers



MULTICHANNEL



ACOUSTIC ENGINEERS

1. Read instructions – all the safety and operating instructions should be read before the appliance is operated.
2. Retain these instructions – the safety and operating instructions should be retained for future reference.
3. Heed warnings – all warnings on the appliance and in the operating instructions should be adhered to.
4. Follow instructions – all operating and other instructions should be followed.
5. Water and moisture – the appliance should not be used near water, for example near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement or near a swimming pool etc..
6. Ventilation – the appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug or similar surface that may block the ventilation openings. Similarly, the appliance should not be built into an installation, such as a bookcase or cabinet, that may impede the flow of air through the ventilation openings.
7. Heat – the appliance should be situated away from heat sources such as radiators, stoves or other appliances that produce heat.
8. Power sources – the appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
9. Power cord protection – power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles and the point where they exit the appliance.
10. Cleaning – the appliance should be cleaned only as recommended by the manufacturer.
11. Unattended periods – the power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
12. Object and liquid entry – care should be taken so that objects and liquids do not fall into the appliance.
13. Damage requiring service – the appliance should be serviced by qualified service personnel when:
 - i. the power supply cord or the plug has been damaged
 - ii. objects have fallen or liquid has been spilled into the appliance
 - iii. the appliance has been exposed to rain or other serious liquid exposure
 - iv. the appliance does not appear to operate normally or exhibits a marked change in performance
 - v. the appliance has been dropped or the cabinet damaged
14. Servicing – the user should not attempt to service the appliance beyond those measures described in the operating instructions. All other servicing should be referred to qualified service personnel.
15. Grounding or polarisation – precautions should be taken so that grounding or polarisation means for the appliance are not defeated.

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Welcome. In selecting ATC you have chosen an example of the finest audio engineering available. ATC was founded on a principle of engineering excellence, and that principle still defines our products today. Given the right opportunities, ATC products will deliver exceptional audio performance, but the opportunities will only arise from careful and thoughtful installation and use. Please read the following manual fully. It will help you understand the product and to realise its full potential. We are happy to answer questions and offer advice on any issues that arise through installation or use of ATC products. Contact details can be found at the back of this manual.

ATC was founded in London in 1974 by Australian emigre Bill Woodman, who still heads the company today. An enthusiastic pianist and engineer he was naturally drawn to loudspeaker design and after a period working at Goodmans, where many of the names that went on to found British loudspeaker companies began their careers, he struck out on his own. The premise on which ATC began is a simple one, and one that in many respects is still true today: hi-fi loudspeakers tend to be detailed and accurate but of limited dynamic range, while professional monitor speakers tend to express the opposite character. ATC products were designed from the outset to offer the best of both. It's an easy concept to describe, but surprisingly difficult to engineer.

The difficulty inherent in designing such loudspeakers is one of scale. Hi-fi levels of accuracy and detail call for lightweight moving parts and delicate engineering. Professional monitor levels of performance however demand far more robust components engineered to survive the rigours of high level use for extended periods. The only way to combine the two is through precision engineering of a class and scale more often associated with aerospace or motorsport. But the results are worth the effort and the cost. ATC loudspeakers, with their unique in-house designed drivers, combine the best of hi-fi and professional to devastating effect.

ATC has become synonymous with active systems. Choosing to offer active loudspeakers (where the passive crossover network is replaced by active filters and multiple power amplifiers) is simply a result of the uncompromising attitude to loudspeaker design. While passive systems still have their place, and ATC engineering skills can still bring remarkable results from them, "active" is a fundamentally better solution to the problems posed by accurate, high level music reproduction. The ATC instinct is always for the better solution. Not cheaper, not quicker, but better.

It was the development of active loudspeakers that first brought ATC into electronics design and engineering. Active speakers demand multiple power amplifiers so ATC from the mid 1980s became not just a loudspeaker manufacturing company but an electronics manufacturer too. The further step from electronics for active speakers to a range of stand-alone amplifier products was natural and now means that ATC engineering is available from the recording desk or CD player output to the ears.

From modest beginnings ATC has grown to become one of the very few manufacturers successful across both domestic and professional audio. By selecting ATC you join a group of music lovers, professional audio engineers, studios and musicians across the World that understand and value the engineering that goes into an ATC product - and the sound that comes out.

1.1 Description

The CA2 preamplifier is designed to partner ATC active, and with an appropriate power amplifier, passive loudspeaker systems. It incorporates six line-level stereo inputs and one stereo record output on RCA phono sockets, and a main stereo output on XLR sockets.

The AUX 2 line-level input may be converted to function as a high-sensitivity phono input through the addition of a factory fitted optional RIAA Phono Board. The RIAA board carries an array of slide switches that enable optimal matching with phono cartridges of various output voltages and loading requirements.

Selection of CA2 inputs is achieved via a five-position rotary control using gold plated relays for silent switching. Output volume adjustment is achieved through a precision motorised potentiometer. A tape monitor function can be selected from a front panel push button. The tape output is a duplicate of the signal selected by the input selector. Mute and standby functions are also accessible from front panel push buttons. Mains power is applied from a rear panel mounted switch. A rear panel mounted 1/4 inch stereo headphone socket can be used with or without the main speakers in use.

All CA2 functions are duplicated on the ATC SCAR-B remote control handset.

1.2 Installation

The CA2 is designed to be free standing either within an equipment stand or simply on a convenient item of furniture. There are no special ventilation requirements, however it is recommended that at least 100 mm (4 inches) clearance is left behind the unit for plugs and cables.

The CA2 is designed to remain powered-up in Standby mode unless it is to be unused for a long period of time. The power dissipation of the CA2, in either standby or operational mode, will make it warm to the touch. Temperature stability will be reached after approximately three hours from mains switch-on. Full audio performance is however available immediately.

The CA2 should be located so as to minimise the cable length from the source components. The preamplifier output can effectively drive up to 50m of good quality cable so it is practical therefore to locate the CA2 a distance away from the monitors or power amplifier(s).

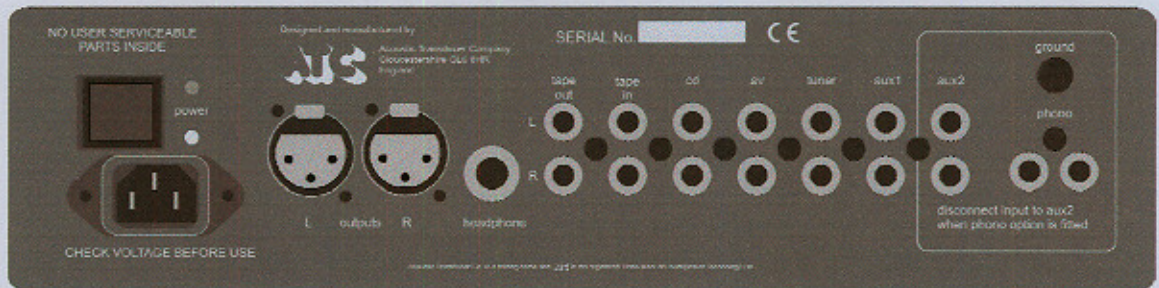
1.3 Mains Connection

The CA2 can be used with mains voltages from 100V to 240V, 50/60Hz. Ensure that the local mains voltage matches that uppermost on the rear panel voltage selector plate before applying mains power to the CA2. The mains voltage selection can be adjusted by lifting the selector plate marked with the four legends (100, 120, 220, 230) with a small screwdriver and re-inserting the plate with the correct voltage uppermost.

The mains cable is specifically supplied to comply with local statutory safety approvals and alternatives should not be substituted. If you intend to use your CA2 in an alternative territory please contact ATC for advice. If an alternative mains plug is required it must be connected with the BROWN cable to LIVE, BLUE cable to NEUTRAL and GREEN/YELLOW cable to EARTH. On no account should the CA2 mains cable be connected without an effective mains earth.

A power supply fuse is fitted within the CA2 but it is not intended to be user replaceable. If you suspect that the power supply fuse has failed the CA2 should be returned to ATC or the local representative for service. For 230/240V operation a 3A fuse should be fitted to the mains plug.

Diagram 1 - CA2 rear panel and connection sockets



1.4 Inputs

The CA2 accepts unbalanced RCA Phono style inputs sockets. The signal is present on the centre conductor of an unbalanced input and the signal return is made via the screened outer. If there is any hum present on the inputs this must be traced to its source and not suppressed by the removal of screens or earths. Removal of the screen on an unbalanced input is likely to result in uncontrollably loud hum. The input sockets are illustrated in Diagram 1.

All inputs are line-level sensitivity via RCA phono connectors on the rear panel. Inputs are labelled for CD, TUNER, AV, AUX1 or AUX2 however they are electrically identical and a line level signal from any source equipment type may be connected to any input.

The right-hand (viewed from the rear) pair of AUX 2 input sockets will function as a high-sensitivity phono input if the optional RIAA Vinyl Board is installed. The RIAA circuitry can be configured to accommodate a wide selection of phono cartridge types by setting combinations of the board mounted jumpers (links). Access to the board is gained by removing the top panel of the preamplifier. Diagram 2 illustrates the position of the jumpers on the board while Table A details the cartridge matching options available.

Links are moved by pulling them gently away from the board with a small pair of pliers and are replaced in the appropriate positions as shown in the diagrams. Unused links can be "parked" on the board by setting them at right angles on unused pins.

Jumpers J3 and J4 set the input load for each channel of the cartridge. With the jumpers in place the load is 100 ohms. With the jumpers removed the load is 47 kilohms.

Jumpers J1, J2, J5 and J6 set the gain (sensitivity) of the RIAA input. J1 and J2 have two positions A and B. In position A the gain of the RIAA circuit is reduced, in position B the gain is increased. J5 and J6 can have the jumper fitted or removed. When fitted the gain of the circuit is increased. By setting combinations of these 4 jumpers a range of sensitivities can be accommodated.

For example: for a cartridge with a low sensitivity, J1 and J2 would be set in position B while J5 and J6 would both have their jumper fitted. Table A illustrates the input sensitivity and load characteristics available. The manufacturer of the cartridge in use should be able to recommend the appropriate settings.

The left-hand AUX 2 input sockets must not be used when the Phono Board is installed.

Diagram 2 - RIAA Phono Board and Jumpers

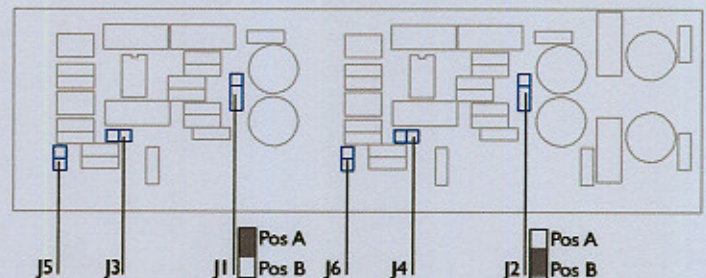


Table A - RIAA Jumper Settings

Jumper settings for 1 Volt Output

Sensitivity	J1 and J2	J3 and J4	J5 and J6
10.0mV	Position A	Fitted (100Ω)	Removed
6.7mV	Position A	Removed (47kΩ)	Removed
5.1mV	Position B	Fitted (100Ω)	Removed
3.4mV	Position B	Removed (47kΩ)	Removed
2.2mV	Position A	Fitted (100Ω)	Fitted
1.4mV	Position A	Removed (47kΩ)	Fitted
1.1mV	Position B	Fitted (100Ω)	Fitted
0.7mV	Position B	Removed (47kΩ)	Fitted

1.5 Outputs

The CA2 rear panel, illustrated in Diagram 1, carries sockets for main left and right output, tape left and right output and stereo headphones. Use of the headphone jack leaves the main outputs unaffected. The front panel mute function, which does not affect the headphone output, may be used to suppress the main outputs when headphones are in use.

Connections to the main output XLR sockets follow the convention of pin 1 to ground, pin 2 to signal "hot" and pin 3 to signal return (signal ground). When connecting to equipment with XLR (balanced) inputs the connectors should be wired pin for pin (ie. 1 to 1, 2 to 2 and 3 to 3). For RCA (phono) unbalanced connection the "hot" and signal return (pins 1 and 3) should be joined at the RCA plug. Diagram 3 illustrates the XLR output pin arrangement. Diagram 4 illustrates the cable arrangement for connection to balanced inputs. Diagram 5 illustrates the cable arrangement for connection to unbalanced inputs.

Cables up to 50 metres in length may be connected to the main balanced outputs.

1.6 Operation

Once connected to mains power and powered-up from the rear panel mains switch, the front panel Standby button (or remote handset Standby button) will switch the CA2 between standby and active modes. In Standby mode the Standby indicator glows RED. Operating the Standby function from either the front panel or remote handset will switch the CA2 into active mode. The RED indicator will extinguish and be replaced by the Input Select indicator showing the current selection in GREEN. Operating the Standby function again will return the CA2 to Standby mode.

Inputs are selected by rotating the Input select control in either direction. The control has continuous movement. When it is moved to the last input, further rotation will select the first input.

Diagram 3 - output socket pins

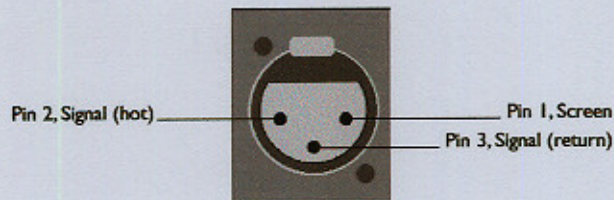


Diagram 4 - balanced cable

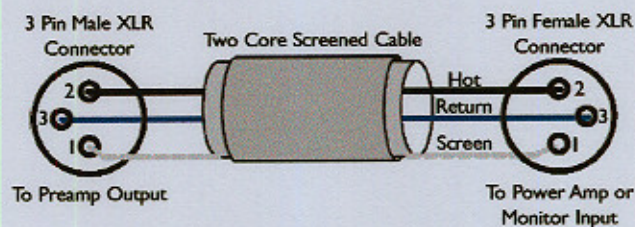


Diagram 5 - unbalanced cable

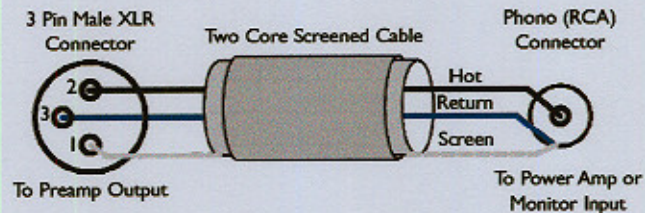
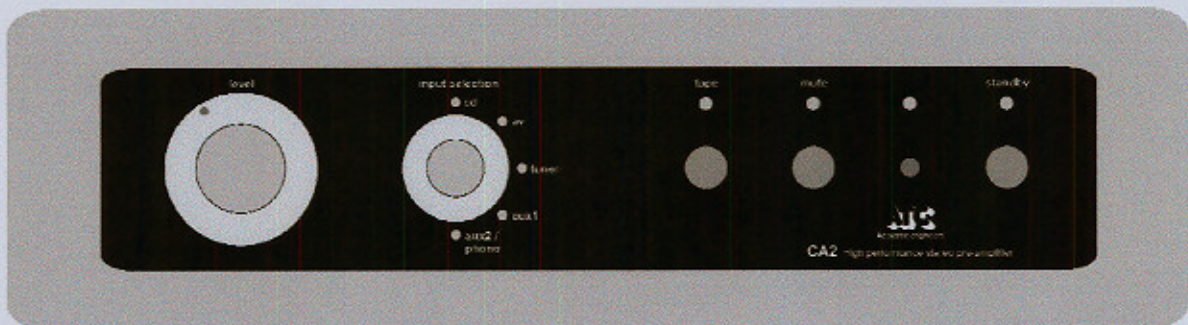


Diagram 6 - CA2 front panel and controls



Operation cont'd

A separate tape loop is included with a Monitor option selected by a single push button on the front panel. The tape output will have the same signal as selected by the rotary input select control. Operation of the Standby or tape monitor controls will not affect this output providing mains power is maintained.

Output level is controlled by the rotary Volume control on the front of the unit, the position of which is indicated by a small gold pin. Rotating the control clockwise will increase the output level. It is good practice to lower the volume setting before switching on the preamplifier or any associated equipment, or while changing the input selection.

Due to the nature of the electronics in ATC amplifiers it is quite normal for a sound to be heard from the speaker when the power is applied or disconnected. The noise heard will not damage the speaker and is quite normal. Although ATC uses the highest-grade components, a different noise may be heard from each speaker due to slight tolerance variations in the amplifier components.

1.7 Remote Handset

Included with the CA2 is the ATC SCAR-B remote control handset. This provides for remote operation of all the CA2 functions and includes a standard set of CD transport commands which may be used to control any CD or DVD / SACD player that supports the RCS control code set. Power is supplied by 4 x AAA batteries (included).

1.8 Care and Maintenance

High technology material finishes are used in this product. The surfaces are durable and with a little care can be kept as good as new even under conditions of heavy use. Normally a dry duster will be all that is required to keep the finishes clean.

Heavy soiling can be cleaned using a cloth slightly moistened with a non-abrasive household cleaner.

There are no components within the CA2 that can be considered expendable, or that would benefit from regular maintenance. There is no

CA2

Main Output Level	7.5V RMS Into 600 Ohms
Input Sensitivity	150mV for 1V out at full gain
Input Impedance	5k Ohms
Output Impedance	10 Ohms
Amplitude Response	DC - 200kHz ± 0.1 dB
Total Harmonic Distortion	< -110dB
Crosstalk	-98dB at 10kHz
Power Requirements:	100, 115, 230V, 50/60Hz
Power Consumption	35 VA (maximum)
Tape Output	Direct
Main Output Connector	Balanced Male XLR
Dimensions (HxWxD)	80 x 320 x 280mm
Overall Weight	6.8kg (15lb)
Finish	Black and clear anodised aluminium

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requirement for any kind of routine service work and there is no schedule for preventative maintenance.

There are no user replaceable parts within the unit and in the unfortunate event of any malfunction, repair should be referred to either the supplying dealer or consultant, the relevant distributor, or ATC.

1.9 Warranty and Contact

All ATC products are guaranteed against any defect in materials or workmanship for a period of two years from the date of purchase. Within this period we will supply replacement parts free of charge provided that the failure was not caused by misuse, accident or negligence.

Purchasers who complete and return the Warranty Card will have their warranty period extended up to a period of six years from the date of purchase. This guarantee does not limit statutory rights.

ATC can be contacted at:

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Down, Stroud, Gloucestershire GL6 8HR, UK.

Telephone: 01285 760561

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Email: info@atc.gb.net

Website: www.atc.gb.net

2.1 Description

The SCA2 is an extremely high resolution preamplifier designed to partner ATC active, and, with an appropriate power amplifier, passive loudspeaker systems. It incorporates eight line-level stereo inputs, two stereo signal outputs and two stereo record outputs. Two of the line inputs are balanced format on XLR sockets while the remaining inputs are unbalanced and on pairs of RCA phono sockets. The main stereo output is balanced format on a pair of XLR sockets while the auxiliary stereo output is unbalanced and on a pair of RCA phono sockets. The two record outputs are unbalanced on pairs of RCA phono sockets.

The AUX 2 line-level input may be converted to function as a high-sensitivity phono input through the addition of a factory fitted optional RIAA Phono Board. The RIAA board carries an array of slide switches that enable optimal matching with phono cartridges of various output voltages and loading requirements.

Selection of SCA2 inputs is achieved via a eight-position rotary control using gold plated relays for silent switching. The SCA2 incorporates an independent record output signal path so enabling simultaneous listening and recording of different source signals. Selection of the record output signal is achieved via a second eight-position rotary control using gold plated relays for silent switching.

Output volume adjustment is achieved through a precision motorised potentiometer. Mute, gain and standby functions are also accessible from front panel push buttons. Mains power is applied from a rear panel mounted switch.

All SCA2 functions are duplicated on the ATC SCA-Remote control handset.

2.2 Installation

The SCA2 is designed to be free standing either within an equipment stand or simply on a convenient item of furniture. It is important however that the support surface for the SCA2 is solid and free from vibration. There are no special ventilation requirements for the SCA2, however it is recommended that at least 100 mm (4 inches) clearance is left behind the unit for plugs and cables.

The SCA2 is designed to remain powered-up in Standby mode unless it is to be unused for a long period of time. The power dissipation of the SCA2, in either standby or operational mode, will make it warm to the touch. Temperature stability will be reached after approximately three hours from mains switch-on. Full audio performance is however available immediately. The SCA2 should be protected from excessive heat, and must not be allowed to come into contact with any liquid.

The SCA2 should be located so as to minimise the cable length from the source components. The preamplifier output can effectively drive up to 50m of good quality cable so it is practical therefore to locate the SCA2 a distance away from the monitors or power amplifier(s).

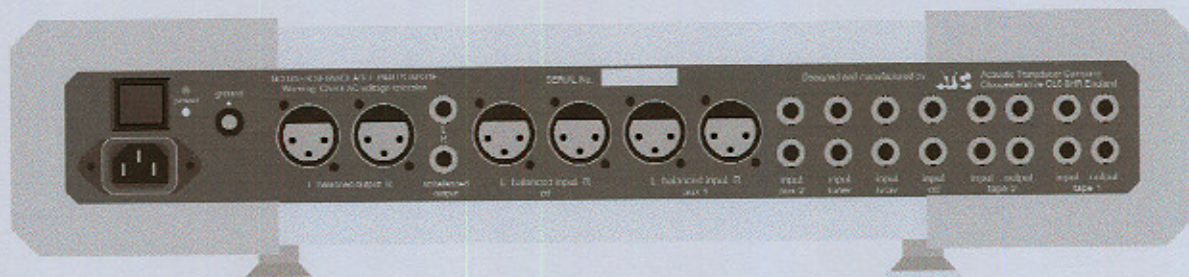
2.3 Mains Connection

The SCA2 can be used with mains voltages from 100V to 240V, 50/60Hz. Ensure that the local mains voltage matches that uppermost on the rear panel voltage selector plate before applying mains power to the SCA2. The mains voltage selection can be adjusted by lifting the selector plate marked with the four legends (100, 120, 220, 230) with a small screwdriver and re-inserting the plate with the correct voltage uppermost.

The mains cable is specifically supplied to comply with local statutory safety approvals and alternatives should not be substituted. If you intend to use your SCA2 in an alternative territory please contact ATC for advice. If an alternative mains plug is required it must be connected with the BROWN cable to LIVE, BLUE cable to NEUTRAL and GREEN/YELLOW cable to EARTH. On no account should the SCA2 mains cable be connected without an effective mains earth.

A power supply fuse is fitted within the SCA2 but it is not intended to be user replaceable. If you suspect that the power supply fuse has failed the SCA2 should be returned to ATC or the local representative for service. For 230/240V operation a 3A fuse should be fitted to the mains plug.

Diagram 1 - SCA2 rear panel and connection sockets



2.4 Inputs

The SCA2 can accept two balanced XLR inputs and six unbalanced RCA phono style inputs (2 as part of tape record/listen sets). The rear panel and input sockets are illustrated in Diagram 1. The input types and their identifying legends are illustrated in following Table A.

The AUX 2 input sockets will function as a high-sensitivity phono input if the optional SPH2 RIAA Vinyl Board is installed. The RIAA circuitry can be configured to accommodate a wide selection of phono cartridge types by setting combinations of board mounted links. Access to the board is gained by removing the top panel of the preamplifier. Diagram 2 illustrates the position of the links on the board while Diagram 3 and Table B detail the cartridge gain and input matching options available.

Links are moved by pulling them gently away from the board with a small pair of pliers and are replaced in the appropriate positions as shown in the diagrams. Unused links can be "parked" on the board by setting them at right angles on unused pins.

The SPH2 board is split into two identical channels. For the sake of clarity on the diagrams, the settings for only one channel are shown. Settings for one channel should be duplicated on the other. The cartridge gain and matching options should be used as described below.

Gain: Gain is set by fitting the Z link in one of two positions (Z1 to Z2 or Z2 to Z3) and by setting a combination of X and Y links. These links should be fitted according to the desired input sensitivities specified in Table B.

Table A - Input Sockets

Input socket types and legends

Rear Panel Legend	Front Panel Legend	Input Type	Notes
balanced input cd	cd bal	XLR balanced x 2	
balanced input aux 1	aux 1	XLR balanced x 2	
input aux 2	aux 2	RCA phono x 2	Marked "phono" on rear if SPH2 RIAA board fitted
input tuner	tuner	RCA phono x 2	
input tv/av	tv/av	RCA phono x 2	
input cd	cd	RCA phono x 2	
input tape 2	tape 2	RCA phono x 2	Part of record/listen set
input tape 1	tape 1	RCA phono x 2	Part of record/listen set

Diagram 2 - SPH2 Board and Link Locations

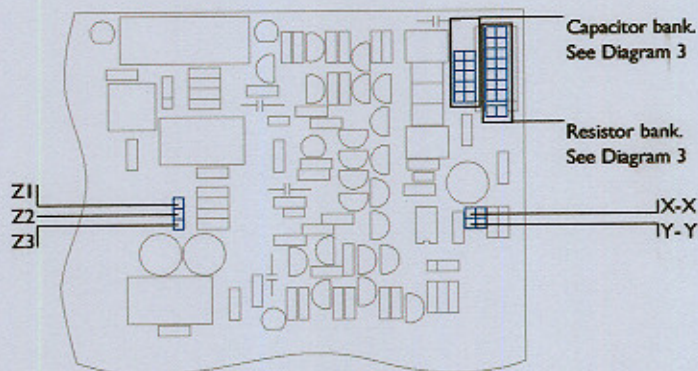


Diagram 3 - SPH2 Load Capacitor and Resistor Options

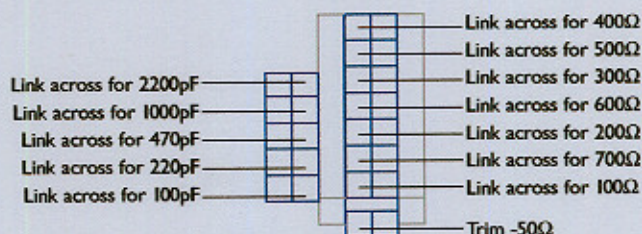


Table B - RIAA Board Gain Stage Link Setting

Mid point gain stage set LOW (11dB) Link Z1 to Z2

First gain stage settings.

Gain Setting	Gain mV	Gain dB	Link Position
High	1.14mV	59dB	Link both Y-Y and X-X
High/mid	1.6mV	55dB	Link Y-Y only
Mid	3.3mV	49dB	Link X-X only
Low	33.0mV	30dB	No links

Mid point gain stage set HIGH (24dB) Link Z2 to Z3

First gain stage settings.

Gain Setting	Gain mV	Gain dB	Link Position
High	0.25mV	71dB	Link both Y-Y and X-X
High/mid	0.38mV	68dB	Link Y-Y only
Mid	0.78mV	62dB	Link X-X only
Low	7.5mV	42dB	No links

Capacitive Load: Capacitive load is set by selecting a link for the appropriate capacitance value as illustrated in Diagram 3. Multiple links may be used, in which case the load value is the sum of the selected values. For example, links in the 470pF position and 1000pF position give a total load value of 1470pF.

Resistive Load: Resistive load is set by selecting a link for the appropriate capacitance value as illustrated in Diagram 3. If no link is selected the default resistive load is 47 kilohms - appropriate for the majority of moving-magnet cartridges. A link in the -50Ω position will reduce any selected load by 50 ohms. For example, links in the 200Ω position and -50Ω position give a total load value of 150Ω.

Cartridge suppliers and manufacturers will be able to provide details of the loading and gain settings appropriate to their products. On some occasions there will be no specific recommendation for the capacitive load on moving-coil cartridges. In these cases it is best to assume no capacitance need be selected (no links used).

The rear panel ground terminal should be used to connect the pick-up arm earth lead.

2.5 Outputs

The SCA2 rear panel, illustrated in Diagram 1, carries sockets for balanced main left and right output, unbalanced main main left and right output, and two unbalanced tape record outputs.

Choice between the balanced and unbalanced main outputs will depend on the input capabilities of the following power amplifier (or active speakers). Use the balanced option in preference if both options are possible.

Connections to the primary output XLR sockets follow the convention of pin 1 to ground, pin 2 to signal "hot" and pin 3 to signal return (signal ground). When connecting to equipment with XLR (balanced) inputs the connectors should be wired pin for pin (ie. 1 to 1, 2 to 2 and 3 to 3). Diagram 4 illustrates the XLR output pin arrangement and Diagram 5 the connection scheme for a balanced XLR - XLR cable.

The unbalanced main left and right outputs and the tape record outputs should be connected using good quality RCA phono terminated leads. Use of the front panel volume, mute, or gain functions does not effect the tape record signal.

Cables up to 50 metres in length may be connected to the main outputs. Tape record cables should be limited to 10 metres.

2.6 Operation

Once connected to mains power and powered-up from the rear panel mains switch, the front panel Standby Reset button (or remote handset Standby button) will switch the SCA2 between standby and active modes. In standby mode the Standby Reset indicator will illuminate. Operating the Standby Reset function will switch the SCA2 into active mute mode. The Standby Reset indicator will extinguish and the Mute indicator will illuminate.

Diagram 4 - balanced output socket pins

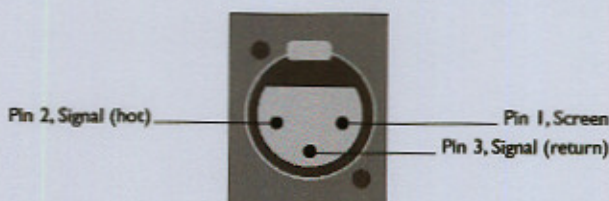
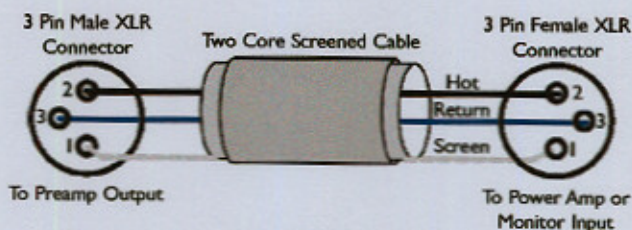


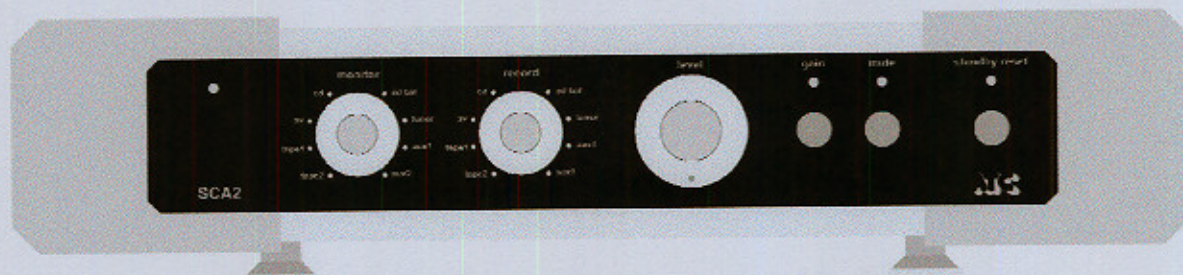
Diagram 5 - balanced cable pin connections



SCA2

Operation cont'd

Diagram 6 - SCA2 front panel and controls



The **Mute** function automatically engages when the SCA2 is switched from standby to active mode. This precautionary feature provides an opportunity for the volume and input settings to be checked before audio is passed to the power amplifiers.

If all is well, the SCA2 may be brought into full operation by pressing the Mute function. The Mute indicator will extinguish. The Mute function can be used at any time to silence the system.

Inputs are selected by rotating the **Monitor** select control. The green indicator next to each monitor option will illuminate to indicate selection. The control has continuous movement. When it is moved to the last input, further rotation will select the first input.

Volume level is adjusted by rotating the **Level** control. A red indicator on the control indicates the level selected.

Volume level can be reduced immediately by 12dB by operating the **Gain** function. The Gain indicator illuminates to indicate its use.

Optimum sound quality will be achieved when the SCA2 has reached normal operating temperature and for this reason it is recommended that it be left in standby mode when not in use. It is a wise precaution however to switch-off the SCA2 from the rear panel power switch if it is to be left unused for an extended period.

The **Record** select control selects the input source routed to the tape outputs. The green indicator next to each record option will illuminate to indicate selection. The control has continuous movement. When it is moved to the last input, further rotation will select the first input. The source selected is made available at the tape output sockets and is fully buffered to prevent

signal interaction. The Level, Gain and Mute functions have no effect on the record output signals.

Tape copying can be performed by selecting Tape 1 on the Record control to copy from Tape 1 to Tape 2. In this case no signal will be routed to the Tape 1 output sockets. Copying from Tape 2 to Tape 1 can be achieved in a similar manner.

Selecting Tape 1 on the Monitor control while also recording to Tape 1 (i.e. tape 1 is also selected on the record control) enables the off-tape signal from a three head tape machine to be monitored. The Tape 2 circuit works in an identical manner.

Due to the nature of the electronics in ATC amplifiers it is quite normal for a sound to be heard from the speaker when the power is applied or disconnected. The noise heard will not damage the speaker and is quite normal. Although ATC uses the highest-grade components, a different noise may be heard from each speaker due to slight tolerance variations in the amplifier components.

2.7 Remote Handset

The optional SCA R remote handset can be used to control the SCA2. Provided that the SCA2 is connected to mains power and its rear panel power switch is on, the handset provides for remote operation of all the SCA2 functions. The SCA R also includes a standard set of CD transport commands which may be used to control any CD or DVD / SACD player that supports the standard RCS control code set.

Use the handset **On/Reset** button to switch the SCA2 into active mode and the **Standby** button to return the SCA2 to standby mode. **Monitor** and **Record** selection can be made by pressing the desired monitor or record button. The SCA2 front panel source indicators will illuminate but the rotary controls will not rotate.

Volume is controlled through the handset **Level +** and **-** buttons. The SCA2 front panel Level control will rotate in response to handset level commands. The handset **Attn** button is equivalent to the front panel Gain function. The handset **Mute** function operates in exactly the same way as the front panel control.

Reliable operation of the remote handset requires direct line of sight between the handset and the SCA2 front panel. Correct operation is indicated by illumination of the red indicator on the left hand side of the front panel as handset commands are received.

The red indicator on the handset will flash as functions are operated. Failure of this indicator points to exhaustion of the handset battery. The battery should be replaced, and the old one disposed of, by your local dealer or distributor.

SCA2

MAIN OUTPUTS

Output Level	15V RMS into 600 Ohms balanced 7.5V RMS into 600 Ohms unbalanced
Output Impedance	10 Ohms
Effective Input Noise	<-120dB (all inputs)
Total Harmonic Distortion	<-114dB (0.0002%)
Crosstalk	<-100dB at 1kHz
Frequency Response	DC - 500kHz
Linearity (Left-Right)	>0.2dB
Input Sensitivity	150mV for 1V out at full gain
Input Impedance	5k Ohms
Connectors	XLR (balanced) RCA Phono (unbalanced)

TAPE OUTPUTS

Signal to Noise Ratio	>100dB
Total Harmonic Distortion	<-95dB
Crosstalk	-100dB
Frequency Response	10Hz - 80kHz
Output Level	0dB
Connectors	RCA Phono

INPUTS

Sensitivity (for 1V output)	275mV (balanced) 150mV (unbalanced)
Input Impedance	>5k Ω (balanced) >10k Ω (unbalanced)
Primary Gain Stage	0dB (balanced) +6dB (unbalanced)
Connectors	XLR (balanced) RCA Phono (unbalanced)

POWER REQUIREMENTS

Supply	Selectable -100V to 240V, 50/60Hz
Power Consumption	10VA - 35VA

DIMENSIONS

Dimensions (HxWxD)	100 x 440 x 360mm
Overall Weight	9.5kg (21lb) unpacked 11.5kg (25.3lb) packed
Finish	Grey and clear anodised aluminium.

ATC reserves the right to vary products and specifications without prior notice. Acoustic Transducer Co. is a trading name and ATC is the registered trade mark of Loudspeaker Technology Ltd.

2.8 Care and Maintenance

High technology metal finishes are used in these products. The surfaces are durable and with a little care can be kept as good as new even under conditions of heavy use. Normally a dry duster will be all that is required to keep the finishes clean.

Heavier soiling of the aluminium casing of the SCA R handset and SCA2 corners and control knobs can be cleaned using a cloth slightly moistened with a non-abrasive household cleaner - taking extreme care not to allow any liquid to enter the units. Switch off and disconnect the SCA2 from the mains power before cleaning.

There are no components within the SCA2 or SCA R that would benefit from regular maintenance. There is no requirement for any kind of routine service work and there is no schedule for preventative maintenance.

There are no user replaceable parts within the units and in the unfortunate event of any malfunction, repair should be referred to either the supplying dealer or consultant, the relevant distributor, or ATC.

2.9 Warranty and Contact

All ATC products are guaranteed against any defect in materials or workmanship for a period of two years from the date of purchase. Within this period we will supply replacement parts free of charge provided that the failure was not caused by misuse, accident or negligence.

Purchasers who complete and return the Warranty Card will have their warranty period extended up to a period of six years from the date of purchase. This guarantee does not limit statutory rights.

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Website: www.atc.gb.net

3.1 Description

The SIA2-150 is a high quality integrated amplifier designed to partner ATC passive monitors and other loudspeaker systems. It incorporates five line-level stereo inputs and one stereo record output on RCA phono sockets, and one pair of loudspeaker outputs on WBT connectors.

Selection of SIA2-150 inputs is achieved via a rotary control. Output volume adjustment is achieved through a precision potentiometer. A tape monitor function can be selected from a front panel push button. The tape output is a duplicate of the signal selected by the input selector. A standby function is also accessible from a front panel push button. Mains power is applied from a rear panel mounted switch.

The SIA2-150 incorporates the same gain reduction and loudspeaker protection circuits as ATC's active monitors. This ensures that even when working at very high levels the amplifier is held back from clipping so improving the subjective performance and protecting the loudspeakers from damage.

All SIA2-150 functions are duplicated on the included ATC SCAR-B remote control handset.

3.2 Installation

The SIA2-150 is designed to be free standing either within an equipment stand or simply on an item of furniture. Please contact ATC for advice if the amplifier is required to be mounted in an enclosed area. It is recommended that at least 100 mm (4 inches) clearance is left behind the unit for plugs and cables.

The SIA2-150 is designed to remain powered-up in Standby mode unless it is to be unused for a long period of time. The power dissipation of the SIA2-150, in either standby or operational mode, will make it warm to the touch. Temperature stability will be reached after approximately three hours from mains switch-on. Full audio performance is however available immediately.

The SIA2-150 should ideally be located so as to minimise the cable lengths from both the source components and to the loudspeakers. Use of loudspeaker cables in excess of 20 metres risks causing noticeable degradation in sound quality.

3.3 Mains Connection

The SIA2-150 can be used with mains voltages from 100V to 240V, 50/60Hz. Mains voltage is factory set and should only be adjusted by ATC or your local dealer or distributor. It is wise to ensure that the local mains voltage matches that specified on the rear panel before applying mains power to the SIA2-150.

The mains cable is specifically supplied to comply with local statutory safety approvals and alternatives should not be substituted. If you intend to use your SIA2-150 in an alternative territory please contact ATC for advice. The mains connection must always be earthed.

A power supply fuse is fitted to the rear panel of the SIA2-150. The fuse is 20mm "Type T anti-surge". Should the SIA2-150 fail to switch on when the power switch is operated the fuse should be inspected. Lift out the fuse holder cover using a small flat-blade screwdriver, remove the fuse and inspect it for damage. The fuse rating is 3.15A for 200V - 250V mains voltage and 6.3A for 100V - 120V. Fuses most often fail only because of a serious electrical fault. If this is the case then simply replacing the fuse will only result in another fuse failure. The SIA2-150 should be returned to ATC for service if a second fuse fails.

3.4 Inputs

The SIA2-150 accepts unbalanced RCA Phono style inputs sockets. The signal is present on the centre conductor of an unbalanced input and the signal return is made via the screened outer. If there is any hum present on the inputs this must be traced to its source and not suppressed by the removal of screens or earths. Removal of the screen on an unbalanced input is likely to result in uncontrollably loud hum. The input sockets are illustrated in Diagram 1.

All inputs are line-level sensitivity via RCA phono connectors on the rear panel. Inputs are labelled for Aux, Av, Tuner, Cd and Tape however they are electrically identical and a line-level signal from any source equipment type may be connected to any input.

Diagram 1 - SIA2-150 rear panel and connectors



3.5 Outputs

The SIA2-150 rear panel, illustrated in Diagram 1, carries connectors for left and right loudspeaker, and tape left and right outputs on RCA Phono sockets.

Loudspeaker connections are made using the two pairs of WBT connectors on the rear panel. The left and right channels are clearly marked and correspond to the left and right inputs. The loudspeaker terminals are labelled positive and negative. The wire used for the connections to the monitors will have some identification for the positive conductor. Usually this is red, but may be a moulded stripe on the insulation. The positive conductor connects to the positive terminal on the SIA2-150 and also to the positive or red connector on the rear of the monitor. The terminals on the rear of the SIA2-150 will accept either bare wire up to 5.7mm diameter or 4mm male plugs. When bare wire connections are made the insulation should be carefully removed from each conductor with a sharp knife to expose 12mm of conductors. The conductors should be tightly twisted together and inserted into the connector ensuring that no stray strands of wire cause a short circuit.

It is important that both loudspeakers are connected with the same polarity. That is; both positive loudspeaker terminals are connected back to positive amplifier terminals and both negative loudspeaker terminals connected back to negative amplifier terminals.

The SIA2-150 is suitable for loudspeaker systems with a nominal impedance of 4 Ohms or greater.

The tape record outputs should be connected using good quality RCA phono terminated leads. Use of the front panel volume, mute, or gain functions does not affect the tape record signal. Tape record cables should be limited to 10 metres in length.

3.6 Operation

Once connected to mains power and powered-up from the rear panel mains switch, the front panel **Standby** button (or remote handset **Standby** button) will switch the SIA2-150 between standby and active modes. In Standby mode the Standby indicator illuminates. Operating the Standby function from either the front panel or remote handset will switch the SIA2-150 into active mode. The Standby indicator will extinguish and be replaced by the **Input Select** indicator showing the current selection. Operating the Standby function again will return the SIA2-150 to Standby mode.

Inputs are selected by rotating the Input Select control in either direction. The control has continuous movement. When it is moved to the last input, further rotation will select the first input.

A separate tape loop is included with a **Monitor** option selected by a single push button on the front panel. The tape output carries the same signal as selected by the Input Select control. Operation of the Standby or Tape Monitor functions will not affect the tape output providing mains power is maintained.

Output level is controlled by the rotary **Volume** control on the front of the unit, the position of which is indicated by a small gold pin. Rotating the control clockwise will increase the output level. It is good practice to lower the volume setting before switching on the preamplifier or any associated equipment, or while changing the input selection.

Due to the nature of the electronics in ATC amplifiers it is quite normal for a sound to be heard from the speaker when the power is applied or disconnected. The noise heard will not damage the speaker and is quite normal. Although ATC uses the highest-grade components, a different noise may be heard from each speaker due to slight tolerance variations in the amplifier components.

3.7 Remote Handset

Included with the SIA2-150 is the ATC SCAR-B remote control handset. This provides for remote operation of all the SIA2-150 functions and includes a standard set of CD transport

Operation cont'd

3.7 Remote Handset cont'd

commands which may be used to control any CD or DVD / SACD player that supports the RC5 control code set. Power is supplied by 4 x AAA batteries (included).

3.8 Care and Maintenance

High technology material finishes are used in this product. The surfaces are durable and with a little care can be kept as good as new even under conditions of heavy use. Normally a dry duster will be all that is required to keep the finishes clean.

Heavy soiling can be cleaned using a cloth slightly moistened with a non-abrasive household cleaner.

There are no components within the SIA2-150 that can be considered expendable, or that would benefit from regular maintenance. There is no requirement for any kind of routine service work and there is no schedule for preventative maintenance.

There are no user replaceable parts within the unit and in the unfortunate event of any malfunction, repair should be referred to either the supplying dealer or consultant, the relevant distributor, or ATC.

SIA2-150

Output Power	150 Watts per channel into 8 Ohms
Input Sensitivity	1V
Input Impedance	47k Ohms
Signal/Noise	>105dB
Amplitude Response	5Hz - 200kHz ± 0.1 dB
Crosstalk	<-90dB
Power Requirements:	100, 115, 230V factory set, 50/60Hz
Power Consumption	10 VA (standby minimum) 230VA (powered) 500VA (maximum)
Dimensions (HxWxD)	130 x 440 x 325mm
Overall Weight	19kg (41.8lb)
Finish	Black and grey anodised aluminium

ATC reserves the right to vary products and specifications without prior notice. Acoustic Transducer Co. is a trading name and ATC is the registered trade mark of Loudspeaker Technology Ltd.

3.9 Warranty and Contact

All ATC products are guaranteed against any defect in materials or workmanship for a period of two years from the date of purchase. Within this period we will supply replacement parts free of charge provided that the failure was not caused by misuse, accident or negligence.

Purchasers who complete and return the Warranty Card will have their warranty period extended up to a period of six years from the date of purchase. This guarantee does not limit statutory rights.

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4.1 Description

The SPA2-150 and SPA2-200P are high quality power amplifiers designed to partner ATC passive monitors and other loudspeaker systems. They are both capable of output power considerably in excess of specification. Both also incorporate the same gain reduction and loudspeaker protection circuits as ATC's active monitors. This ensures that even when working at very high levels the amplifiers are held back from clipping so improving the subjective performance and protecting the loudspeakers from damage.

The SPA2-200P features a stereo pair of balanced inputs on XLR sockets while the SPA2-150 incorporates switch selectable balanced and unbalanced signal inputs on XLR and RCA phono sockets respectively. Loudspeaker output connections on both power amplifiers are made through two pairs of WBT connectors.

The SPA2-200P includes a multi-pin connector on the rear panel that provides wired remote control interface facilities while the SPA2-150 can be switched into and out of Standby mode by either ATC remote handset.

Both power amplifiers incorporate comprehensive performance monitoring and feedback through a front panel display.

4.2 Installation

The SPA2-200P and SPA2-150 are designed to be free standing. The power dissipation of the amplifiers is considerable and makes them warm to touch. Temperature stability will be reached after approximately three hours from mains switch-on but full audio performance is available immediately and is not influenced by temperatures within the amplifiers' normal operating range. Care must be taken not to obscure the ventilation holes in the top and bottom covers. Please contact ATC for advice if the amplifier is required to be mounted in an enclosed area.

The SPA2-150 is an aesthetic match for the SCA2 preamplifier and it is quite in order to sit the SCA2 on top of the SPA2-150. A general recommendation regarding the layout of the system is that the distance between the power amplifier and loudspeakers should be minimised. Reducing the length of speaker cables improves the control of amplifier over the loudspeaker system through the reduced resistance of the loudspeaker leads. It may therefore be appropriate to locate the power amplifiers close to the loudspeakers.

There is no general benefit from reducing the length of the interconnect from the an ATC preamplifier to the power amplifier, especially when balanced connections are used. However, non ATC preamplifiers may not be capable of driving cables of more than a few metres.

4.3 Mains Connection

The SPA2-150 and SPA2-200P can be used with mains voltages from 100V to 240V, 50/60Hz. Mains voltage is factory set and should only be adjusted by ATC or your local dealer or distributor. It is wise to ensure that the local mains voltage matches that specified on the rear panel before applying mains power.

The mains cable is specifically supplied to comply with local statutory safety approvals and alternatives should not be substituted. If you intend to use your power amplifier in an alternative territory please contact ATC for advice. The mains connection must always be earthed.

A power supply fuse is fitted to the rear panels of the power amplifiers. The fuse is 20mm "Type T anti-surge". Should a unit fail to switch on when the power switch is operated the fuse should be inspected. Lift out the fuse holder cover using a small flat-blade screwdriver, remove the fuse and inspect it for damage. The fuse rating is 3.15A for 200V - 250V mains voltage and 6.3A for 100V - 120V. Fuses most often fail only because of a serious electrical fault. If this is the case then simply replacing the fuse will only result in another fuse failure. The power amplifier should be returned to ATC for service if a second fuse fails.

4.4 Inputs

The SPA2-150 is fitted with both unbalanced RCA Phono and balanced XLR inputs. A switch on the rear panel selects between the two. The SPA2-200P incorporates only balanced XLR inputs.

Note: Do not attempt to connect both balanced and unbalanced inputs at the same time. The selector switch is not a toggle between the two inputs. The XLR and RCA input connectors are wired in parallel and the switch merely arranges for either balanced or unbalanced input.

The signal is present on the centre conductor of an unbalanced RCA Phono style input and the signal return is made via the screened outer. If there is any hum present on the inputs this must be traced to its source and not suppressed by the removal of screens or earths. Removal of the screen on an unbalanced input is likely to result in uncontrollably loud hum.

All signal cables and plugs should be of a good quality. Poor cable and plug quality will compromise the performance of your system. The signal input pin configuration for XLR sockets is illustrated in Diagram 1 while Diagram 2 illustrates a balanced cable.

4.5 Signal Cable Options

Balanced cables are always the preferred option, for the SPA2-150P however unbalanced connection is possible. Diagrams 2 and 3 illustrate the signal cable connections required for each option. Balanced (XLR to XLR) connection offers lower noise and better immunity to "hum" pick-up. Unbalanced (XLR to Phono or Two Pole Jack) connection carries risk of hum caused by multiple signal earths.

Hum problems resulting from unbalanced connection may be reduced by making ONE of the following modifications to the signal cable connections: If the driving preamplifier (or desk) is "double insulated" (i.e. has no mains earth), disconnect the signal cable screen at the RCA Phono plug end. Alternatively, disconnect the signal cable screen at the XLR end. This second option will make the source the reference signal earth.

4.6 Outputs

Loudspeaker connections are made to the SPA2-150 and SPA2-200P through WBT connectors on the rear panels. The left and right channels are clearly marked. The loudspeaker terminals are labelled positive and negative. The wire used for the connections to the monitors will have some identification for the positive conductor. Usually this is red, but may be a moulded stripe on the insulation. The terminals will accept either bare wire up to 5.7mm diameter or 4mm male plugs. When bare wire connections are made the insulation should be carefully removed to expose 12mm of conductor. The conductors should be tightly twisted together and inserted into the connector ensuring that no stray strands of wire cause a short circuit.

It is important that both loudspeakers are connected with the same polarity. That is; both positive loudspeaker terminals are connected back to positive amplifier terminals and both negative loudspeaker terminals connected back to negative amplifier terminals.

The SPA2-150 and SPA2-200P are suitable for loudspeaker systems with a nominal impedance of 4 Ohms or greater.

Diagram 1 - input connection pins

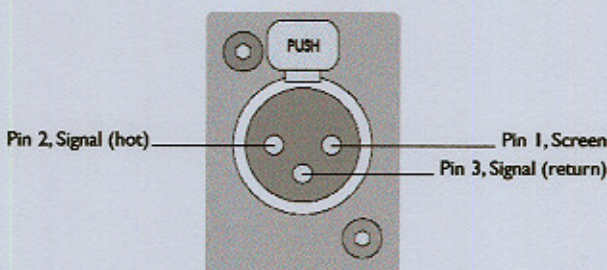


Diagram 2 - balanced cable

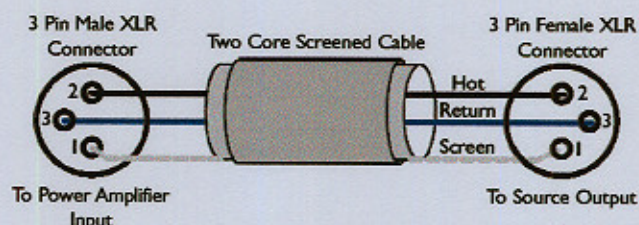
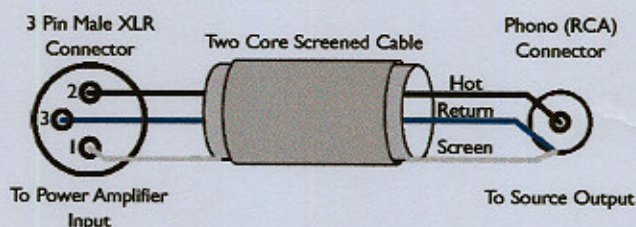


Diagram 3 - unbalanced cable



4.7 Operation

Once connected to mains power and powered-up from the rear panel mains switch, the front panel Standby button (or ATC remote handset Standby button) will switch the SPA2-150 between standby and active modes. The SPA2-200P can only be operated remotely by a custom wired remote system.

With the power switch on, the front panel Standby indicator will illuminate. The unit will then respond to control either from the front panel or, in the case of the SPA2-150 an ATC remote handset. The Standby button on the front panel will switch the amplifier between active and standby modes. The rear panel power switch should be used to isolate the SPA2-150 and SPA2-200P from the mains supply if the units are to be unused for any significant period.

When switched into active mode the unit will go into an initialisation sequence under the control of the internal microprocessor. The standby indicator will extinguish and be replaced by the LED display displaying 0 followed by a flashing decimal point. At this time it is quite possible that the loudspeakers will emit a mild thump as the

amplifier powers up and the initialisation routine is carried out. When, after a few seconds, the initialisation is complete, the figure 0 is replaced by a constantly lit decimal point. The unit is now in the normal active mode. The initialisation sequence is illustrated in Diagram 4.












An indicator adjacent to the left of the Standby button illuminates when the amplifier receives remote control signals. It will also illuminate if the signals received are not intended for the amplifier - CD or preamplifier controls for example.

At all times during the operation of the SPA2-150 and SPA2-200P their internal microcomputer will monitor the important aspects of amplifier operation. Their front panel LED displays will warn of overdrive and fault conditions on either or both channels. The units will shut down if excessive temperature or DC offset faults arise but, as the amplifiers are designed to accommodate overdriving abuse indefinitely, they will keep running. Sound quality will however be impaired by the operation of the protection circuitry. There is also the possibility of damage to the loudspeakers when driven at such high levels. It is therefore prudent to reduce the system volume level to below the overdrive indication threshold. The display and its interpretation is illustrated in Diagram 4.

Excessive temperature and DC offset are both potentially very damaging and the amplifier will shutdown whilst displaying the fault condition that caused the problem. Excessive temperature is only likely if the output load is too great or if the ventilation is inadequate. The amplifier will not reset until the operating temperature has had time to return to normal. DC offsets generally indicate a faulty source or preamplifier. The power amplifier will not reset until the fault has been cleared.

Due to the nature of the electronics in ATC amplifiers it is quite normal for a sound to be heard from the speaker when the power is applied or disconnected. The noise heard will not damage the speaker and is quite normal. Although ATC uses the highest-grade components, a different noise may be heard from each speaker due to slight tolerance variations in the amplifier components.

Diagram 4 - Display legends

	Initialisation: The decimal point flashes to show initialisation is in progress.
	Normal Operation: The decimal point illuminates to show the amplifier is powered-up and is healthy.
	Over Temperature: Indicates that the temperature is over 90°C in the left amplifier channel. This condition will shut down the amplifier. Pressing the Standby button will restore the amplifier to normal only if the temperature has dropped significantly.
	Over Temperature: Indicates that the temperature is over 90°C in the right amplifier channel. This condition will shut down the amplifier. Pressing the Standby button will restore the amplifier to normal only if the temperature has dropped significantly.
	Over Temperature: Indicates that the temperature is over 90°C in both amplifier channels. This condition will shut down the amplifier. Pressing the Standby button will restore the amplifier to normal only if the temperature has dropped significantly.
	DC Offset: Indicates a DC voltage of greater than 1V present on the output of the left amplifier. This condition will shut down the amplifier. Pressing the Standby button will restore the amplifier to normal only if the fault has been cleared.
	DC Offset: Indicates a DC voltage of greater than 1V present on the output of the right amplifier. This condition will shut down the amplifier. Pressing the Standby button will restore the amplifier to normal only if the fault has been cleared.
	DC Offset: Indicates a DC voltage of greater than 1V present on the output of both amplifiers. This condition will shut down the amplifier. Pressing the Standby button will restore the amplifier to normal only if the fault has been cleared.
	Overdrive: Indicates that maximum drive has been reached on the left amplifier and that the gain reduction circuits are operating to prevent clipping.
	Overdrive: Indicates that maximum drive has been reached on the right amplifier and that the gain reduction circuits are operating to prevent clipping.
	Overdrive: Indicates that maximum drive has been reached on both amplifiers and that the gain reduction circuits are operating to prevent clipping.

4.8 Remote Operation

ATC remote control handsets may be used with the SPA2-150 to provide remote operation of the standby function.

The SPA2-200P incorporates a rear panel multipin connector that enables custom remote control systems to be developed. Please contact ATC directly for technical information and advice on the development of such systems.

	SPA2-150	SPA2-200P
Output Power	150 Watts/Channel into 8 Ohms	200 Watts/Channel into 8 Ohms
Balanced Input Sensitivity	1V	1V
Balanced Input Impedance	10 kilohms	10 kilohms
Balanced Input C.M.R.R	-90dB @ 1kHz	-90dB @ 1kHz
Unbalanced Input Sensitivity	2V	2V
Unbalanced Input Impedance	10 kilohms	10 kilohms
Signal/Noise	>110dB	>110dB
Amplitude Response	5Hz - 200kHz ± 0.1 dB	5Hz - 200kHz ± 0.1 dB
Crosstalk	<-105dB	<-105dB
Distortion (at rated power)	<-95dB	<-95dB
Power Requirements:	100, 115, 230V factory set, 50/60Hz	100, 115, 230V factory set, 50/60Hz
Power Consumption	10 VA (Standby minimum) 180 VA (Nominal) 600 VA (Rated Output)	10 VA (Standby minimum) 180 VA (Nominal) 600 VA (Rated Output)
Dimensions (HxWxD)	146 x 440 x 426mm	130 x 428 x 325
Overall Weight	26kg (57.3lb)	22kg (48.5lb)

4.9 Care and Maintenance

High technology metal finishes are used in these products. The surfaces are durable and with a little care can be kept as good as new even under conditions of heavy use. Normally a dry duster will be all that is required to keep the finishes clean.

Heavier soiling of the aluminium can be cleaned using a cloth slightly moistened with a non-abrasive household cleaner - taking extreme care not to allow any liquid to enter the units. Switch off and disconnect the units from the mains power before cleaning.

There are no components within the units that would benefit from regular maintenance. There is no requirement for any kind of routine service work and there is no schedule for preventative maintenance.

There are no user replaceable parts within the units and in the unfortunate event of any malfunction, repair should be referred to either the supplying dealer or consultant, the relevant distributor, or ATC.

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4.10 Warranty and Contact

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Purchasers who complete and return the Warranty Card will have their warranty period extended up to a period of six years from the date of purchase. This guarantee does not limit statutory rights.

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