



VANTAGE

CONTROLS



MULTI-ZONE AMPLIFIER INSTRUCTION MANUAL

Axiom
450 Series

WARNING:

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

CAUTION:

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



WARNING
RISK OF ELECTRIC SHOCK
DO NOT OPEN

AVIS
RISQUE DE CHOC ELECTRIQUE
NE PAS OUVRIR



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Important Safety Instructions

- 1 Read these instructions.
- 2 Keep these instructions
- 3 Heed all warnings
- 4 Follow all instructions
- 5 Do not use this apparatus near water
- 6 Clean only with dry cloth
- 7 Do not block any ventilation openings, Install in accordance with the manufacturer’s instructions
- 8 Do not install near any heat source such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11 Only use the attachments/accessories specified by the manufacturer.
- 12 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 13 If you install the apparatus in a built-in installation, such as a bookcase or rack, ensure that there is adequate ventilation. Leave 1U rack space or 44mm (1.75”) of free space at the top, 75mm (3”) at the sides and 100mm (4”) of free space at the rear. The rear edge of the shelf or board above the apparatus shall be set 10cm (4”) away from the rear panel or wall, creating a flue-like gap for warm air to escape. Good airflow is necessary to help ensure proper operation. Not only should you provide enough free space around the unit, but also ensure that air can flow freely and escape from the amplifier surroundings. Failure to do so may cause thermal shutdown of the unit, or intermittent channel cutout and reduced life expectancy. A thermal temperature log is kept.
- 14 Never expose the unit to moisture
- 15 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus. The apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- 16 Damage requiring service
Unplug the apparatus from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - A) When the power supply cord or plug is damaged
 - B) If liquid has been spilled, or objects have fallen into the apparatus.
 - C) If the apparatus has been exposed to rain or water,
 - D) If the apparatus does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the apparatus to its normal operation.
 - E) If the apparatus has been dropped or damaged in any way, and
 - F) When the apparatus exhibits a distinct change in performance this indicates a need for a service.
- 17 Object and Liquid Entry
Never push objects of any kind into the apparatus through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.
Don’t put candles or other burning objects on top of this apparatus.

Precautions

1. Recording Copyright

Unless it's for personal use only, recording copyrighted material is illegal without the permission of the copyright holder.

2. Care

Occasionally you should dust the unit all over with a soft cloth. For stubborn stains, use a soft cloth dampened with a weak solution of mild detergent and water. Dry the unit immediately afterwards with a clean cloth. Don't use abrasive cloths, thinners, alcohol, or other chemical solvents, because they may damage the finish or remove the panel lettering.

3. Power

WARNING

BEFORE PLUGGING IN THE UNIT FOR THE FIRST TIME – READ THE FOLLOWING SECTION CAREFULLY.

AC outlet voltages vary from country to country. Make sure that the voltage in your area meets the voltage requirements printed on the unit's rear panel (e.g., AC 230V, 50HZ or AC 120V, 60Hz)

4. Power Cord

The power cord plug is used to disconnect this unit from the AC power source. Make sure that the plug is readily operable (easily accessible) at all times:

Never Touch This Unit With Wet Hands – Never handle this unit or its power cord while your hands are wet or damp. If water or any other liquid gets inside this unit, have it checked by your Vantage / Axium dealer.

5. Handling Notes

- If you need to transport this unit, use the original packaging to pack it how it was when you brought it.
 - DO not leave rubber or plastic items on this unit for a long time, because they may leave marks on the case.
 - This unit's top and rear panels may get warm after prolonged use. This is normal.
 - If you do not use this unit for a long time, it may not work properly the next time you turn it on, so be sure to use it occasionally.

6. Speaker Shorts

Under no circumstances should the speaker output terminals of the unit be short circuited, or connected to another output.

7. RS232 Connection

Avoid plugging the RS232 cable into the unit while power is connected.

8. Direct Sun light

Avoid installing the amplifier in positions where the front panel is exposed to direct sunlight - may cause control to become sluggish.

9. Controller Connection

Never connect more than four controllers to the 12VDC power supply terminals. The supply is internally fused and will open circuit (self-resetting)

Never connect the amplifier's 12VDC terminals to an external power supply.

For U.S. models

FCC information for User

CAUTION:

The user changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For Canadian Models

NOTE: THIS CLASS B DIGITAL APPARATUS COMPLIES WITH CANADIAN ICES-003

For models having a power cord with a polarized plug:

CAUTION: TO PREVENT ELECTRIC SHOCK, MATCH WIDE BLADE OF PLUG TO WIDE SLOT FULLY INSERT.

Modèle pour les Canadien

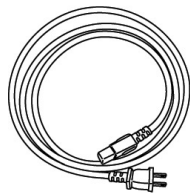
REMARQUE: CET APPAREIL NUMÉRIQUE DE LA CLASSE B EST CONFORME À LA NORME NMB-003 DU CANADA.

Sur les modèles dont la fiche est polarisée:

ATTENTION: POUR ÉVITER LES CHOCS ÉLECTRIQUES, INTRODUIRE LA LAME LA PLUS LARGE DE LA FICHE DANS LA BORNE CORRESPONDANTE DE LA PRISE ET POUSSER JUSQU'AU FOND.

Supplied Accessories

Make sure you have the following accessories:



AC Power Cable



CD-ROM

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Quick Install Guide

Unpacking

Immediately upon receiving your 450 series amplifier inspect the carton for evidence of mishandling during shipment. Then carefully unpack the unit and inspect for damage.

Please save the shipping carton and all inner packing materials in the event that the 450 series amplifier needs to be shipped for service or moved to a new location.

Should you discover that the 450 series amplifier has been damaged during shipping please contact your dealer immediately.

1. Check website for latest firmware, and upload if not current.
2. If adding an amplifier to an exiting stack or combining amplifiers all firmware must be the same on all amplifiers
3. Zone setting. The units all ship with zones 1,2,3,4 already setup.
To add additional amplifiers to a stack the zones must be changed on the additional amplifiers. If there are zone duplications in a stack of amplifiers the zones with the same number will exactly mirror each other's operation.
To change an amplifier zone follow the following steps.
 - Do not connect the expansion bus cable.
 - From the front facia rotate the Knob to select the appropriate amplifier – turn it on, and then select the 'More' menu (right arrow). Scroll through the menu and select 'Set Zone' and change to the required assignment pushing the Knob to set.
4. Wire the keypads to the rear of the amplifier.
5. To setup the keypad follow the Controllers instruction manual, Briefly:
 - with a zone, press the SET key (behind the cover plate) followed by the S2 key
 - Turn the required amplifier zone ON and OFF twice. The Keypad beeps signalling it has been successfully zoned. The Keypad now controls that zone.
 - Learn codes into the Keypad by first selecting the source button ie S3. Press the SET key followed by the S1 key to enter keypad IR learning mode.
 - Press the button you want to learn an IR code into.
 - Align the remote with the front lower window and press the button on the remote to donate the IR code to that button. Continue learning codes for that source.
 - Press the SET key to exit learn mode.
 - Select the next source, ie S2. Then press SET followed by S1 and repeat the learning process.
6. To prevent a user from changing the 450 series amplifier's critical installation settings, 'Setup Lockout' can be selected in the Setup Menu. To enter the setup menu press and hold the Encoder knob for > 10second, scroll through to 'Setup Lockout' enter and select 'Yes'. The 'More' menus on the amplifier are no longer accessible to the user.
7. To unlock the 450 series amplifier, return to the setup menu as above. And enter the password: 1396

Features

Thank you for purchasing an Axiom 450 series Multi-Zone Amplifier.

Please read this manual thoroughly before making connections and plugging in the unit.

Following the instructions in this manual will enable you to obtain optimum performance and listening enjoyment from your new Multi-Zone Amplifier.

Please retain this manual for future reference.

Multi-Zone, Multi-Source, Video Switching

The 450 series amplifier has four separate preamplifiers and amplifiers, providing 4 zones of independent yet integrated control.

There are seven stereo sources (S1 – S7) and an eighth mono source (S8) typically used for paging applications. Each zone has an eight-source composite video switcher, so monitor screen's in four different rooms may display any of the eight sources (S1 – S8).

Preamplifiers and Outputs

Each zone has bass, treble, balance and loudness control. These are accessed either from the front panel or MC (Music Center) program.

The preamplifier output volume may be independent of the amplifier volume, or made to track the amplifier with an adjustable offset ($\pm 20\text{dB}$). The tracking feature is ideal for passive subwoofer control, while the independent volume feature is useful for limited control in close-coupled rooms.

A useful protection feature is 'Maximum Volume limiting'. This limits the maximum volume of either the amplifier or preamplifier.

Amplifier Power, Protection, and Clipping Indicators

50 Watts RMS per channel into 8 ohms, 65Watts RMS per channel into 6 ohms.

The amplifiers are protected against short-term output shorts.

The front panel zone indicators will flash red when the zone amplifiers are overdriven into clipping.

Thermal Control

There are three progressive levels of thermal control:

- Internal fans are turned on to aid cooling at 50°C.
- The amplifier volume is reduced 20dB at 100°C.
- At 105°C the amplifiers are shutdown until the temperature reduces below 50°C.

Care should be taken to ensure adequate ventilation – see "Important safety instructions" on page 1

USB, RS232 and IR control

The 450 series amplifier may be controlled and monitored via either the front Panel USB or rear panel RS232 serial interface.

In multi amplifier installations where the amplifiers are interconnected using an expansion bus cable, only one USB or RS232 connection is required to control the stack of amplifiers.

A 450 series amplifier may receive IR directly from the front panel receiver or via the two 'Controller interface' connections.

There are zone specific IR commands and also a set of global IR commands.

The commands are: ON, OFF, Standby (toggling), Mute, Amp Volume Up, Amp Volume Down, Pre Volume Up, Pre Volume Down, Source Selects, Discrete Audio Source Selects, Discrete Video Source Selects, On with Source Specific commands.

The Global commands also include PRESET1 – PRESET 6, Alarm Enable, Alarm OFF, & 5 minute Sleep.

Real Time Clock

The 450 series amplifier is equipped with a real time clock.

The amplifier may be set up to function as an alarm clock, so that at 6.30am in the morning 5 days a week, the master bedroom zone could be made to turn on, select tuner, and go to a specific volume. Multiple Alarms are feasible (max of 6) However the Alarm Enable & OFF commands act upon all programmed Alarms.

The Clock automatically compensates for daylight saving.

The clock continues to operate typically > 48 hours without power – more than enough to keep the time current during lengthy power outages.

IR Emitter Ports

There are 4 Buffered IR emitter Ports.

Two IR ports have routing, and are linked to their respective 'Controller Interface' ports. These ports control zone specific source components. Two IR ports are the sum of both IR sources; these control the All zone source components.

Presets and Paging

There are six amplifier presets and a page preset. Presets 1 - 6 cause the amplifier to go to a predetermined setup, i.e. standby, volume & source selection.

The presets may also be programmed with event scheduling, and are used by the alarm clock.

The 'Page Preset' mode is for paging applications and is invoked by a contact closure between the 'OV' and the 'PG' terminals. When the contact closure is released the amplifier zones return to their previous states.

Zone Linking

A zone may be programmed to link one other zone. Zone linking ties the source selection together. It may also tie the volume, and standby. This is useful for closely coupled audio areas where it is advantageous to have different volume control but the same source, or the same volume with separate standby control. Zone linking is setup either via the front panel user interface or by the MC program.

32 Zones

There are 32 zones of possible control. On a 450 series amplifier each zone must be different, however in a multiple amplifier stack same zone amplifiers are possible – they simply mimic every parameter.

Expansion Bus

Data, IR, Amp-On & Audio sources are interconnected via the expansion bus.

The expansion bus feature vastly simplifies the installation cabling of an amplifier stack.

One amplifier is connected to another using a 34-way ribbon cable. Connections are made from the output of the first amplifier to the input of the second etc. All audio sources must be connected to the first amplifier.

Note: Video signals are not passed through the expansion bus.

Door Bell

Looped 1.5 second mono sounds can be generated as part of a page preset.

Suitable 'wav' files are uploaded to the unit using the MC program. MC truncates the 'wav' files to a suitable size.

Buffered Video Outputs

The composite video inputs are buffered for the purpose of expanding to other amplifiers in the installation.

12VDC 1A Power

Two 12VDC jacks are available for powering external accessories.

Discrete Video and Audio Selection

The Video and Audio selection may be independent. There are RS232 and IR Discrete control commands available.

Amplifier ON Status – "Amp-On"

Each zone has front panel ON status indication, and 12VDC OUT on the rear panel connector: (1, 2, 3, 4 & #). The # 'AMP ON' output is a logic 'Or' output, i.e. if any zone is ON then the output will be 12V. This is useful for driving a relay that connects AC power to source equipment. The 'AMP ON' output's are protected against shorts. The 'AMP ON' outputs default to tracking the preamplifier ON status, but may optionally be set to track the amplifier ON status using the MC program.

Power Failure Restoration

After an AC power outage the 450 series amplifier restores its settings to the pre-interrupted state. All internal settings are stored in non-volatile memory, except the clock that runs for at least 48 hours on stored power.

Restore Defaults

The 450 series amplifier may be readily set to the default settings.

Restoring Defaults clears all memory and resets the zone allocations to zones 1 – 4.

Setup Lockout

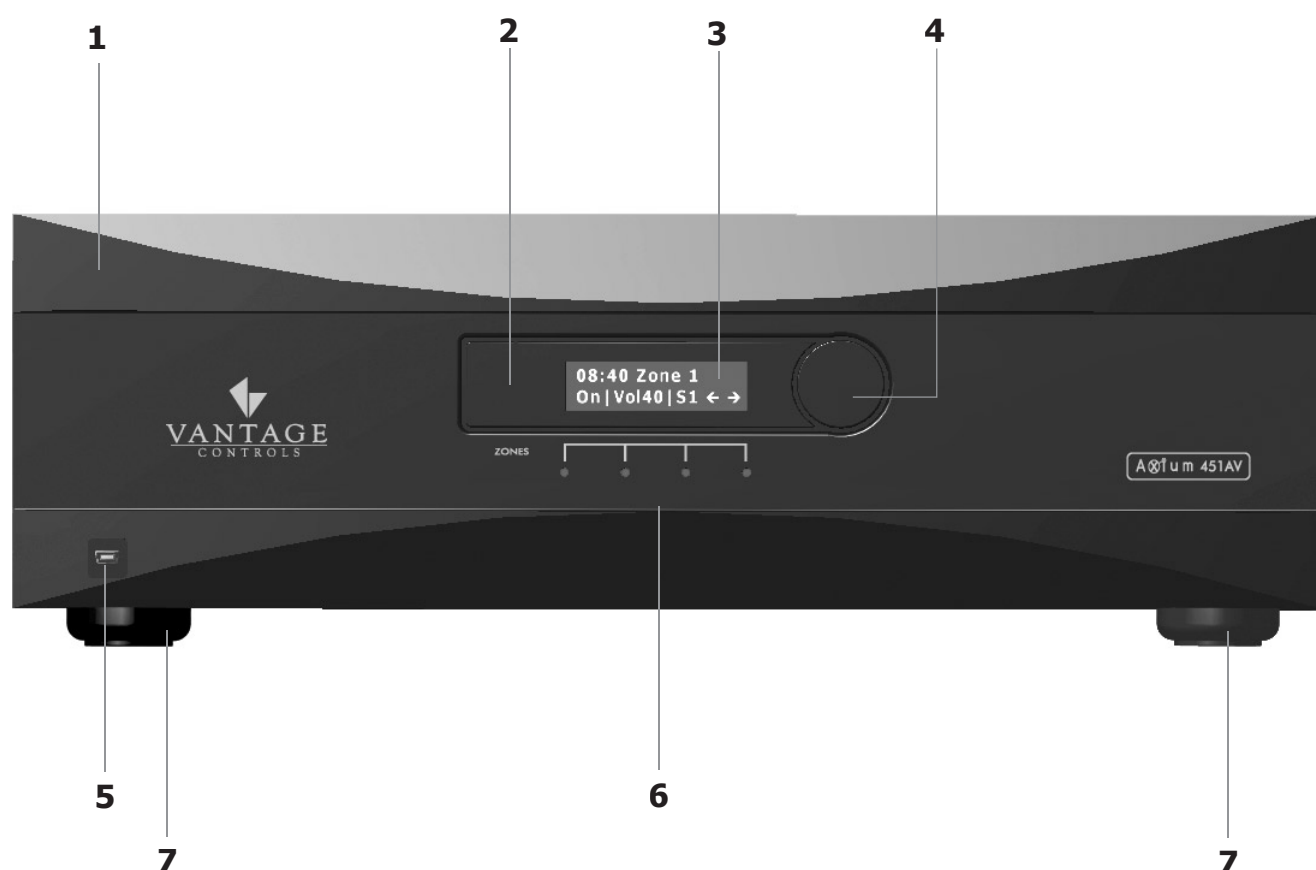
Locks access to the System Setup and More menus where installation critical adjustments can be made.

Password = 1396

Firmware Upgradable

The 450 series amplifiers may be updated with the latest operational firmware, using the USB Uploader program. Provides a degree of future proofing, and flexibility.

Front Panel Guide



1 Front Panel

Solid Aluminium front Panel

2 Infra-Red Receiver

Receiver for front panel IR control – Not IR pass through!

3 LCD display

Back lit LCD display for menu guided control and programming. The display is dimmed when all zones are Off.

4 Multi Jog

The display menus are navigated and selections made using left and right rotation and pushes on the knob.

5 USB Mini B port

The port is used to setup, control or monitor the amplifier.

A USB mini B cable must be used when connecting to a PC

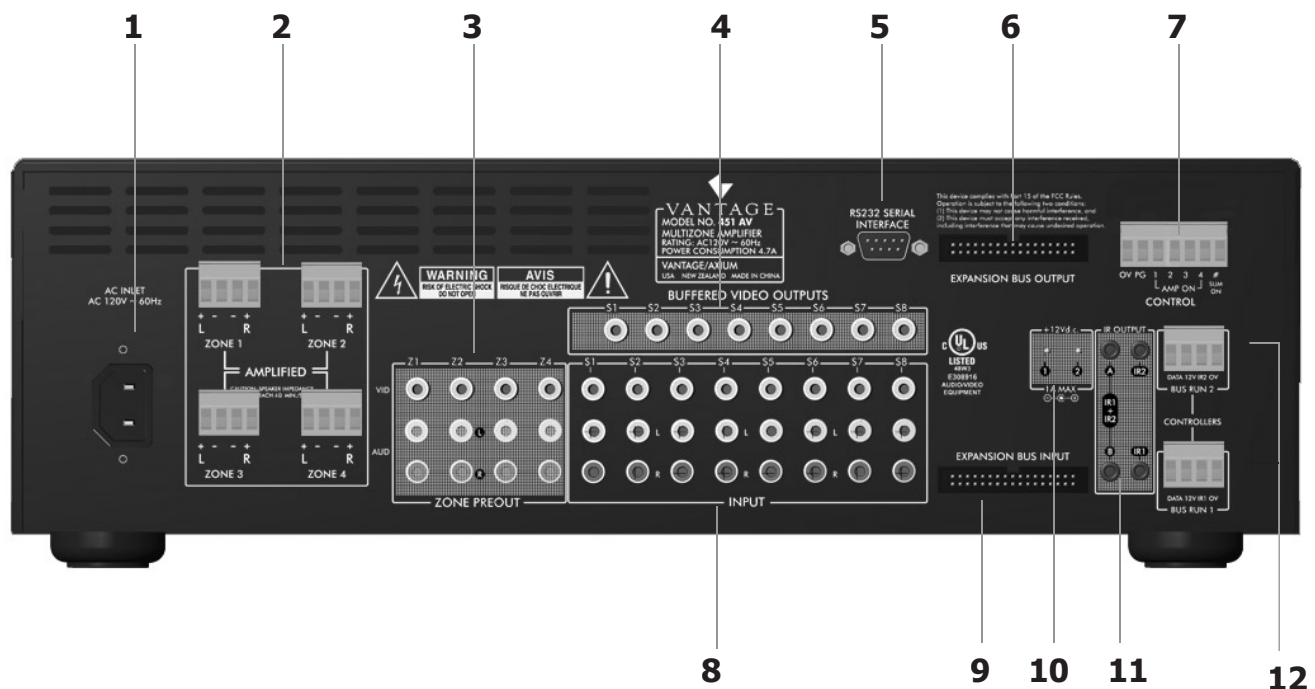
6 Zone Indicators

From Left to right; zones 1 – 4. The indicators are blue when ON, and flash red when the amplifiers are overdriven into clipping

7 Chassis Feet

Set high enough to provide unrestricted airflow through the chassis for convection cooling.

Rear Panel Guide



1 AC Inlet

IEC socket

2 Speaker Terminals

Plug in terminal clamp connectors accept 1.5mm² (15 gauge) speaker wires

3 Zone Preamplifier Out

Audio and composite video outputs.

4 Buffered Video Out

The composite video inputs are buffered to enable expansion to further amplifiers.

5 RS232 Communication Port

The port is used for setup, control or monitoring. A null modem cable must be used when connecting to a PC or control system.

6 Expansion Bus Output

34 way IDC header. Connects to the expansion bus input of the next amplifier in a stack.

7 AMP ON Control

A contact closure between the PG and 0V terminals invokes the Page preset, enabling paging or doorbell activation. AMP-ON 1,2,3 and 4 output 12VDC when the Zone preamplifier or amplifier is ON, while AMP-ON # is 12VDC when any of the zones are ON.

8 Input Terminals

Audio and Composite Video Source inputs.

9 Expansion Bus Input

Connects with another 450 series amplifier's expansion bus output – provides connection of source equipment audio, control and IR.

10 12V Out

The connectors supply 12VDC 1Amp max. Centre Positive, 2.1mm pin diameter.

11 IR Emitter Ports

3.5mm mono jacks. IR1 and IR2 are used to control specific source equipment. The ports only output IR strings received from their associated controller interface.

1R1 + 1R2 are for control of source equipment common to all zones. They output the combined IR1 and IR2 infra-red strings.

12 Controller Interface

For connecting to keypads and IR receivers.

There are two controller interface ports: BUS RUN 1 and 2, and each are linked with an IR emitter port providing IR routing.

The +12VDC output is internally fused - self-resetting – and has a maximum load of four Keypad or IR receivers. The Data terminal sends amplifier status to the Keypads.

Typical System Configuration

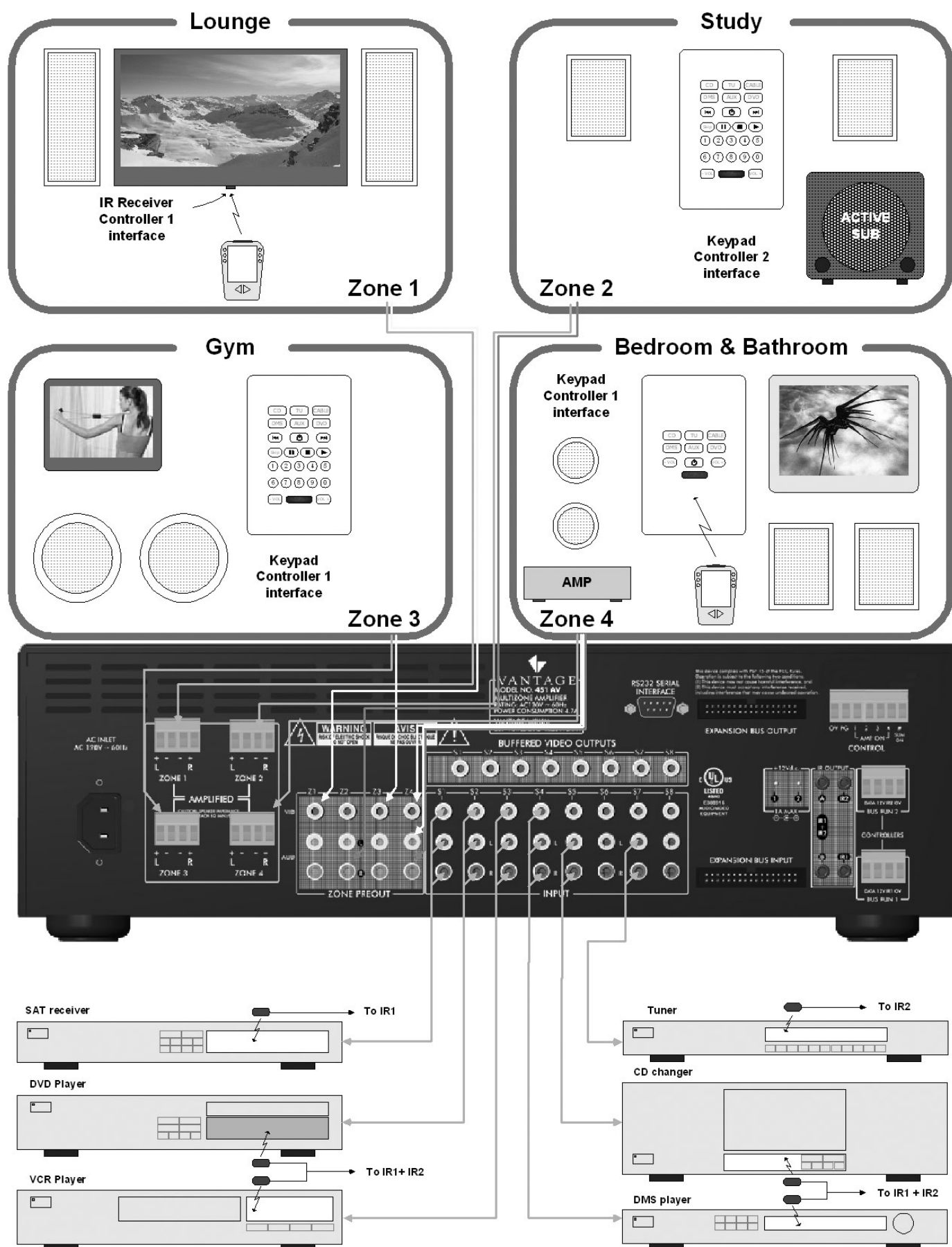


FIG 1

Typical System Configuration – Continued

Fig 1 depicts a typical configuration where the 450 series amplifier is providing audio into four listening zones.

Each zone consists of a room with a pair of speakers, and a suitable controller. Additionally a zone may have monitors or screens.

In Fig 1 three such screens are shown in the Lounge, Gym and Bedroom. Each zone may be listening / watching any of the connected sources: Satellite, DVD, Video, Digital Music server, CD, or tuner.

Controllers

Each zone has a specific control requirement. Choose controllers that best suit the application.

- Zone 1 – The lounge: IR receiver
- Zone 2 – The Study : Keypad
- Zone 3 – The Gym : Keypad with IR receiver
- Zone 4 – The Bedroom: Keypad with IR receiver

Source control IR emitters are plugged into the IR OUTPUT ports.

There are two IR ports (IR1 + IR2) that combine control from the BUS RUN 1 and BUS RUN 2 controller interface ports. These outputs control source equipment available to all zones, i.e. DVD, Video, CD and DMS.

Each controller interface has an associated IR out port that routes IR only to that port. In Fig 1 the SAT emitter is plugged into IR1 port, which means that SAT control is only available to zone 1, 3 and 4 controllers. The Tuner emitter is plugged into the IR2 port, so only the zone 2 controller may control the Tuner.

Source Equipment

The 450 series amplifier has one mono and seven stereo RCA audio inputs for connecting to source equipment. Fig 1 configuration has only six of the possible eight sources populated.

A zone may select from any of the connected sources. Someone in the Lounge may be listening and viewing the DVD, while another in the Study may be listening to music from the Digital Music server.

All four zones may select the same source, in such circumstances there is a possibility that all four zones may be trying to control that source – not always desirable – so a system should be well planned and where appropriate additional source equipment installed.

Speakers

Speakers in each zone are connected to the amplifier by "Home Run" speaker cables.

Fig 1 depicts a powered subwoofer in the study. The subwoofer is driven by the zone 2 preamplifier, and is set to track the zone 2 amplifier volume. The subwoofer volume or offset can be adjusted for correct tonal balance.

Fig 1 additional depicts a pair of speakers in the bedroom. These are the associated Bedroom Bathroom speakers and are driven by a low powered slave amplifier. The zone 4 preamplifier has been set to "Independent mode" and connects to the slave amplifier. Independent mode is where the preamplifier volume may be different from the amplifier volume within a 34dB range or 68% of the volume level. It also has independent standby and muting.

Video Outputs

The composite video outputs are suitable for driving ONE composite video display device. To avoid signal degradation, home runs of appropriate video cable should be less than 100 meters (300ft).

Controller Termination

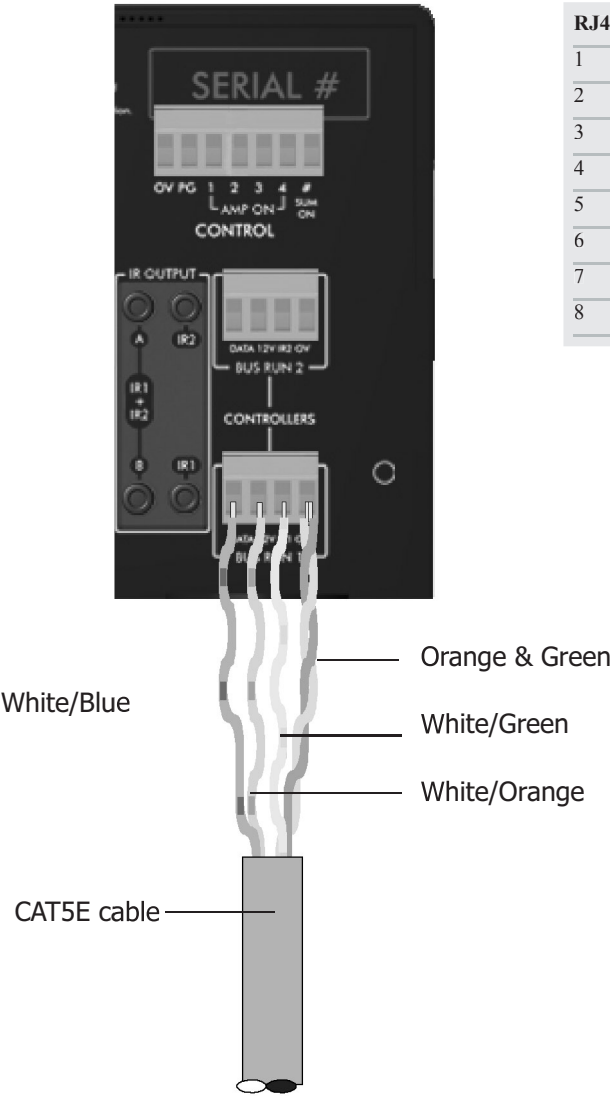


FIG 2

RJ45 Pin	Wire Colour	Keypad function
1	White/Orange	+12V DC supply
2	Orange	0V supply
3	White/Green	IR output
4	Blue	nc
5	White/Blue	Data input
6	Green	0V supply
7	White/Brown	nc
8	Brown	nc

Table 1

The recommended wiring and colour scheme is shown in Fig 2.
Use the Standard 568-B colour code for the CAT5E termination to the Controller – see Table 1
Although it is possible to daisy chain controllers we recommend “home runs” of CAT5E cable with a maximum cable length of 200m (650ft).
Note: Some IR receivers have an Amplifier On indicator, their “On” terminal should be connected to the zone’s AMP ON output not to the controller interface ports “Data” terminal.

Advanced IR Control

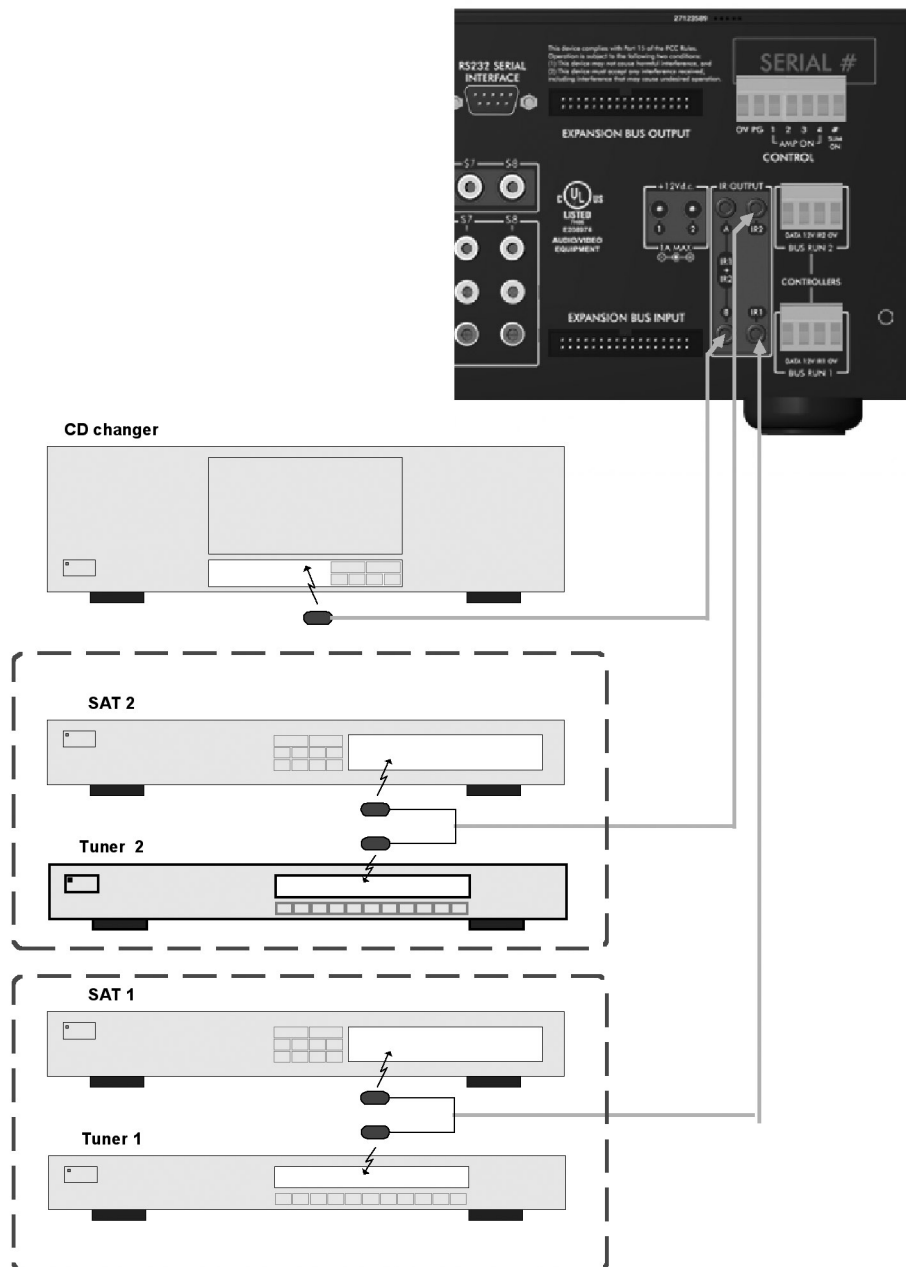


FIG 3

IR routing – discussed in “Typical System configuration” on page 11 is used to address centrally located source equipment.

When multiple same brand / model source equipment is used steps must be taken to isolate the radiated IR from interfering with their discrete operation. This may be achieved by either installing in different cupboards / locations or by using IR blockers over the IR emitters. The IR blockers are the preferred solution since cupboard doors are often left open.

Fig 3 shows a typical installation where several SAT receivers and tuners are required. The dashed lines enclosing the source equipment represent IR isolation.

Multiple 450 Series Amplifier Stacks

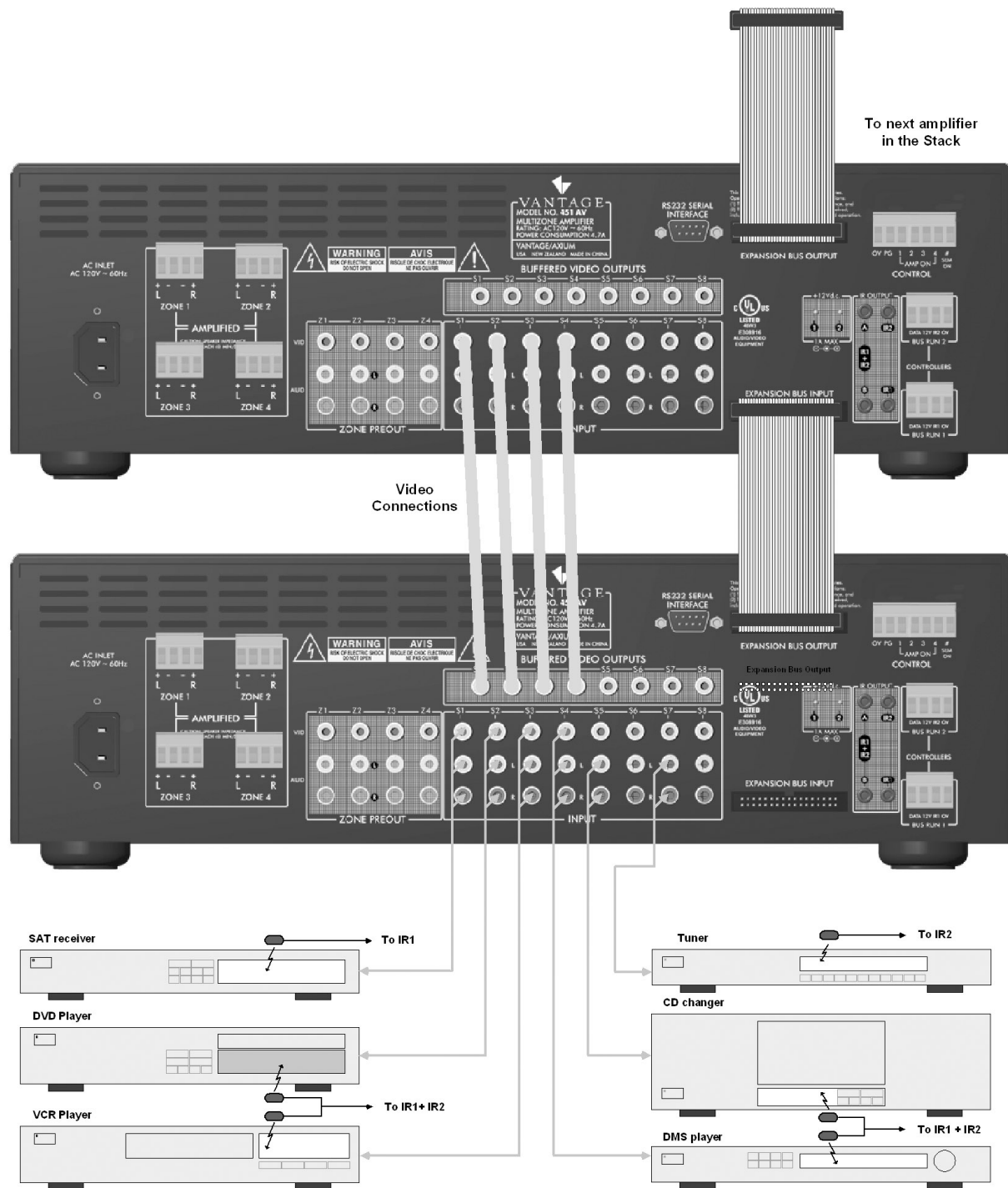


FIG 4

In large installations where multiple 450 series amplifiers are required, the expansion bus may be used to convey inter-amplifier control, source equipment audio and IR control.

Fig 4 shows inter-connected amplifiers using an expansion bus lead. The source equipment audio inputs must be plugged into the first amplifier where they are buffered and sent to the next amplifier in the stack. The maximum recommended expansion is eight units.

If connecting serial RS232 only one connection to any amplifier is necessary.

The composite video inputs are not conveyed through the expansion bus, however the buffered video outputs of the first amplifier can be connected to the video inputs of the next amplifier in the stack.

Zone Linking

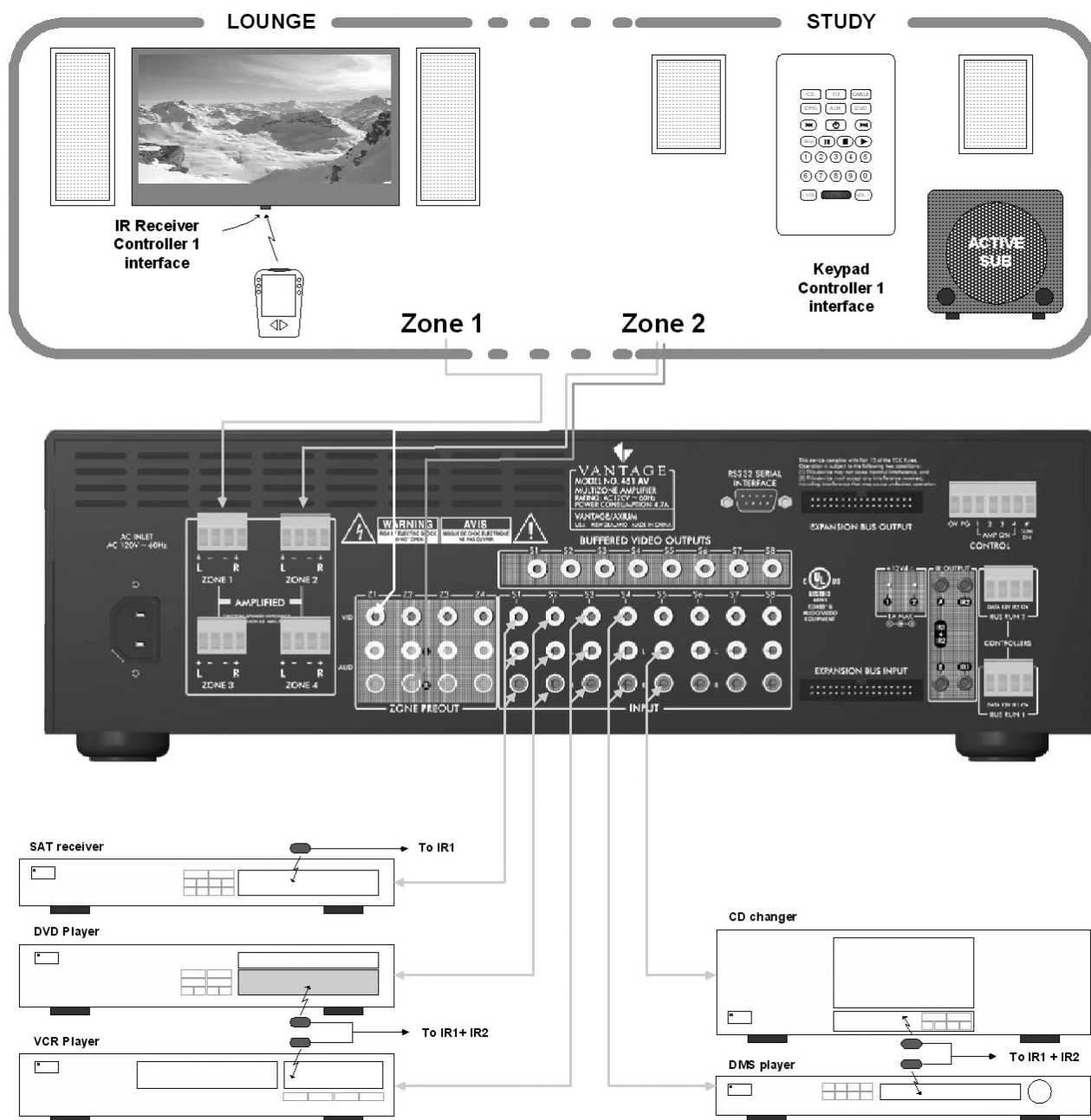


FIG 5

Zone linking is a useful feature for simplifying control in closely coupled rooms, where the rooms require different volume levels and ON /Off status, yet the same audio source.

If for instance the Lounge and Study zones in the 'Typical System Configuration' were always used together on the same source, then zone linking could be used to simplify the control of the two otherwise separate zones.

Zone 2 is simply linked to zone 1 either via the front panel user interface or MC program. Once linked both zones will always select the same source whether controlled by the lounge remote control, or study keypad. A zone can only be linked to one other, i.e. zone 1 linked to zone 2. On the same 450 series amplifier the other two zones may also be linked, i.e. zone 3 linked to zone 4.

Options are also provided for Linking volume &/or standby via the MC program.

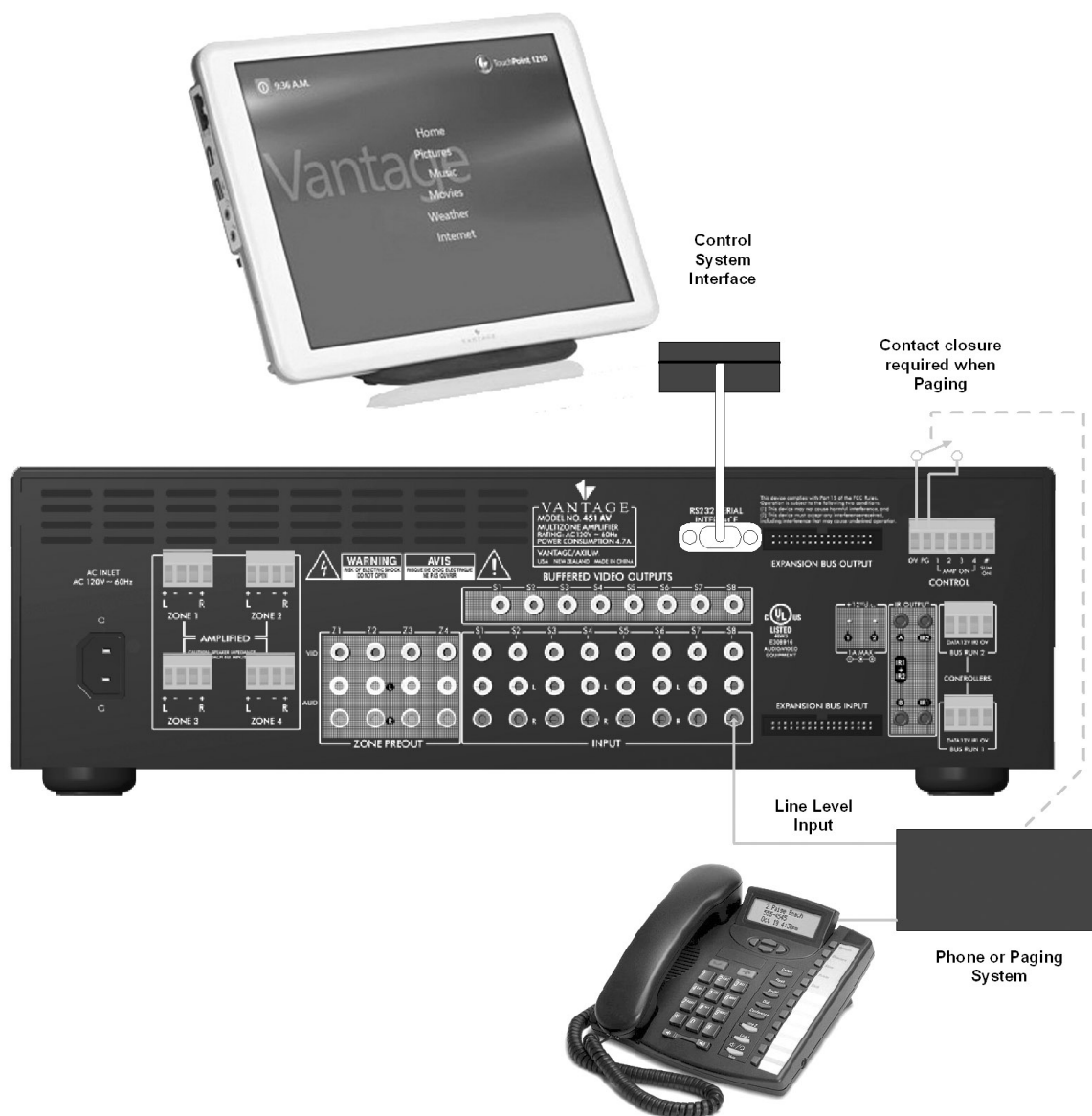


FIG 6

Any amplifier parameter is controllable using the serial RS232 interface. The RS232 protocol is outlined in the following section and encompasses both the amplifier and connected keypads.

The interface is bi-directional, allowing the amplifier and network to be monitored.

The RS232 port connection must be made using a 'Null Modem' cable, where pin's 2 & 3 are swapped at one connector.

Fig 6 shows a typical touch panel controller providing the user interface to a 450 series amplifier.

The controller has it's own operating system that is programmed to handle the RS232 protocol.

An automation system is not restricted to touch panels, it may be an extension of a home lighting, security, building management, or other specialised home automation system.

The 'Page Preset' is a special preset that is invoked whenever there is a contact closure across the 'PG' and 0V terminals. Each zone on the amplifier may be set to a specific input and at specific volumes (depends on room & application). When the contact closure is opened the amplifier returns to its previous states. The 'Page Preset' is useful for telephone paging, door & gate phone paging, or doorbell applications.

Note: The S8 input is summed with the internal doorbell generator

RS232 Protocol

The RS232 serial port provides data acquisition and control of the 450 Series amplifiers and networked keypads by a home automation system, or PC.

The interconnecting cable must be 'Null modem': 9 pin female 'D' connectors at both ends (pin connections 2 and 3 swapped at one end) only RX, TX & 0V (pin 5) are used.

Baud Rate = 9600, Characters are all ASCII.

Command Structure: **<command><zone><data>line feed.**

Command

Command	Description
01	Standby
02	Mute
03	Source Selection
04	Volume
05	Bass
06	Treble
07	Balance
09	Send All parameters
0B	Cause key press on Keypad
0C	Amplifier features
0D	Maximum Volume Limit
0F	Link Zone
11	Volume Up
12	Volume Down
14	Request Device information
1C	Zone Name
1D	Preamplifier Volume Mode
1E	Preset Selection / status
26	Volume BCD format
28	Video Source selection

Zone

Amplifiers and keypads are encoded with up to 32 zones

The zone byte is used for checking if the command is applicable to the device receiving the command and if so, for optionally selecting a "sub-device", e.g. a bank or part of a device. All Zones are addressed using FF.

- The lower 5 bits of the zone byte represent the zone 0 – 31 selection, i.e:
 - ⊙ 00000 bin = 00 (hex) = zone 0
 - ⊙ 00001 bin = 01 (hex) = zone 1
 - ⊙ 01010 bin = 0A (hex) = zone 10
 - ⊙ 11111 bin = 1F (hex) = zone 31
- The upper 3 bits represent the sub-device. The sub-device codes for the 450 series amplifier are:
 - ⊙ standard amplifier = 000
 - ⊙ page preset amplifier = 001
 - ⊙ standard preamplifier = 010
 - ⊙ page preset preamplifier = 011

Examples: Addressing a zone 10 preamplifier: Binary 010-01010 or 4A hex
Addressing a zone 10 amplifier: Binary 000-01010 or 0A hex
Addressing all Zone amp & preamplifier: FF hex

Send ASCII "4A"
Send ASCII "0A"
Send ASCII "FF"

Data

Command	Content
Standby (01)	00 – Standby OFF 01 – Standby ON 04 – Toggle
Mute (02)	00 – Mute 01 – Un-mute 02 – Toggle Mute
Source Selection (03)	00 – S5 01 – S6 02 – S7 03 – S4 04 – S8 05 – S1 06 – S2 07 – S3 40 – S5 Audio only 41 – S6 Audio only 42 – S7 Audio only 43 – S4 Audio only 44 – S8 Audio only 45 – S1 Audio only 46 – S2 Audio only 47 – S3 Audio only
Volume (04)	00 – A0 range
Bass (05)	F4 – 0C (-12db - +12db)
Treble (06)	F4 – 0C (-12db - +12db)
Balance (07)	EC – 14 (Left -20db – Right -20db)
Send all parameters (09)	XX – value ignored
Amplifier features (0C)	00 – Loudness enabled 01 – Loudness disabled
Maximum Volume Limit (0D)	00 – A0 range
Link Zone (0F)	00 – 31 zone to be linked FF – for no zone linking
Volume Up (11)	XX – value ignored
Volume Down (12)	XX – value ignored
Zone Name (1C)	Data field contains the ASCII string
Preamplifier Volume Mode (1D)	00 – A0 range FF = Independent mode.

Command	Content
Preset Selection (1E)	All Zone function: Zone byte = FF 00 – Default : exit preset mode 01 – Force "Page Preset" 02 – Select Preset 1 03 – Select Preset 2 04 – Select Preset 3 05 – Select Preset 4 06 – Select Preset 5 07 – Select Preset 6
Volume BCD Format (26)	0 – 99 in BCD format same as Front Panel display
Video Source selection (28)	00 – S5 Video 01 – S6 Video 02 – S7 Video 03 – S4 Video 04 – S8 Video 05 – S1 Video 06 – S2 Video 07 – S3 Video

Notes:

- ❑ Commands are used as notifications. If an amplifier is switched ON, it will notify the other devices on the Control Bus by sending the Standby command (01). Any amplifiers with the same zone will take the notification as a command and also switch ON.
- ❑ When a command is sent to an amplifier it will first be transmitted on the control bus and then returned to the PC (Home automation system). If an error occurs an error will be returned instead of the original command. The PC (Home automation system) needs to ignore its command when it is returned
- ❑ A Standby ON command implies that the amplifier is not muted, if the amplifier was previously Off, a mute command must follow the Standby command if it is muted.
- ❑ Not all Command and Data commands are covered in this document.
- ❑ The expected reply for the "Send all Parameters" command (09) is >144 bytes. All command fields listed in this document are contained in the reply. The reply also contains advanced commands not listed in this document. The home automation or PC's buffer should be large enough to receive and process the 144-byte reply.
- ❑ If two pairs of zones are linked on a 450 series amplifier, i.e. zones 1 & 2 and zones 3 & 4, and a "Link Zone" command is sent that links zones 2 & 3, then the amplifier has the following implications:
 - ⊙ Zone 2 links to Zone 3
 - ⊙ Since zone 2 is no longer linked to zone 1, zone 1 shall no longer be linked to zone 2.
 - ⊙ Since Zone 3 is no longer linked to zone 4, zone 4 shall no longer be linked to zone 3.

Example strings:

010A01: Standby ON command for zone 10 amplifier
 014A01: Standby command for zone 10 preamplifier
 060002: +2db Treble setting on zone 0
 031F02: S7 source selection on zone 31
 0B0311: Volume down continuous push on zone 3 keypad

RS232 Protocol – Continued

Keypad key codes

A Keypad controller may be directed to emit its learnt IR commands via RS232 control.

This is achieved by sending a 'Cause key press on Keypad' command "0B" followed by the zone, and the Keypad key code (data).

The Keypad key code is encoded with IR string repeats. (See table below)

To terminate a continuously repeating 'Key press', command a "FF" keypad key code must be sent.

AX-KPB Keypad								
REPEATS								KEY
Continuous	1	2	3	4	5	6	7	
00	20	40	60	80	A0	C0	E0	Bank 6 (Amp: S6)
01	21	41	61	81	A1	C1	E1	Bank 5 (Amp: S5)
02	22	42	62	82	A2	C2	E2	Bank 4 (Amp: S4)
03	23	43	63	83	A3	C3	E3	Bank 3 (Amp: S3)
04	24	44	64	84	A4	C4	E4	Bank 2 (Amp: S2)
05	25	45	65	85	A5	C5	E5	Bank 1 (Amp: S1)
08	28	48	68	88	A8	C8	E8	Volume Up
09	29	49	69	89	A9	C9	E9	Standby Command
0A	2A	4A	6A	8A	AA	CA	EA	Mute Command
0C	2C	4C	6C	8C	AC	CC	EC	Volume Down
0E	2E	4E	6E	8E	AE	CE	EE	Standby/Mute
10	30	50	70	90	B0	D0	F0	5
11	31	51	71	91	B1	D1	F1	4
12	32	52	72	92	B2	D2	F2	3
13	33	53	73	93	B3	D3	F3	2
14	34	54	74	94	B4	D4	F4	1
15	35	55	75	95	B5	D5	F5	Skip
16	36	56	76	96	B6	D6	F6	Stop
17	37	57	77	97	B7	D7	F7	Play
18	38	58	78	98	B8	D8	F8	0
19	39	59	79	99	B9	D9	F9	9
1A	3A	5A	7A	9A	BA	DA	FA	8
1B	3B	5B	7B	9B	BB	DB	FB	7
1C	3C	5C	7C	9C	BC	DC	FC	6
1D	3D	5D	7D	9D	BD	DD	FD	-Track
1E	3E	5E	7E	9E	BE	DE	FE	Pause
1F	3F	5F	7F	9F	BF	DF	-	+Track
FF	-	-	-	-	-	-	-	Stops continuous key press

Menu Navigation

Front Panel user interface:

The Axiom 450 series amplifier has a LCD display and multi-jog (Rotary Encoder with Push Select) for menu navigation.

The menus are hierarchal providing access and control of all amplifier functions.

The user navigates through the menu using left / right multi jog rotations and pushes for selections or escapes.

The vertical bars indicate the selected function, while the animated bars indicate the selected function may be edited.

After 30 seconds of multi jog inactivity the menu returns to the currently selected zones primary functions menu. If the Zone is ON then volume will be selected if OFF Power is selected.

Firmware Display



451/452 - AV
Firmware V1

The model and firmware version is displayed for two seconds after initially powering the 450 series amplifier.

Note: The firmware may be updated to the most recent version by using the USB uploader program – check with your dealer for this procedure.

Primary Functions Menu



08:40 Zone 1
| Off | ←



08:40 Zone 1
On | Vol40 | S1 ← →

If the zone is Off then the clock, zone or room name, power Off and select room arrow are displayed.

Selection bars are shown surrounding the "Off" Power Status. Rotating the multi jog left or right shifts the selection bars so that either the power or select room arrow may be selected.

Pushing the multi jog when power is selected will turn the Zone 1 amp ON and display further functions

- **On / Off:** Power Status
- **Vol:** Adjustment 0 – 99.
- **Source Select:** S1 – S8.
- **←** : Select Room
- **→** : More Functions Menu

To adjust volume move the selection bars to surround the volume status and push the multi jog, the selection bars animate – indicating function edit - rotate the multi jog to adjust the volume.

To escape push the multi jog.

To mute or un-mute, long press the multi jog for 2 seconds while the volume is selected.

When making a source selection, S1 has wide selection bars compared to S2 – S8. This is useful reference position should the source names have been changed using the MC program.

Select Room

Select Room: ○○○●
Z4 Amp: Bedroom

The selected device zone, zone number and room name (if named) are displayed.

The Illuminated circle represents the selected device zone. The order – left to right – is the same as the front panel

Zone power indicators – useful feature when the amplifier's zones have been assigned out of order.

Rotating the multi jog moves the selection through the eight possible devices:

- Z1 Amp: Lounge
- Z1 Pre:
- Z2 Amp: Study
- Z2 Pre:
- Z3 Amp: Gym
- Z3 Pre:
- Z4 Amp: Bedroom
- Z4 Pre: Ensuite

Press the multi jog to enter the selected rooms primary function menu.

More Functions Menu

Function:
Bass: 0dB

Selecting the right arrow in the primary function menu accesses the "More Functions Menu"

The available functions are:

- **Bass: 0dB** ± 12dB of adjustment.
- **Treble: 0dB** ± 12dB of adjustment.
- **Balance: 0dB** - 20dB adjustment to the Left or Right.
- **Loudness: Off** Defaults Off, and disabled when PRE is set to independent mode.
- **Max Volume: 99** May be set between the maximum of 99 and minimum of 20.
- **Set Zone: 1** Zone encoding 0 – 31, but not a zone occupied already on the amplifier.
- **Name:** Maximum of 10 characters, upper and lower case text.
- **Link Zone: none** May be linked to any ONE zone.
- **Preamp Volume** Only displayed if the room is a preamplifier.
 - **Mode: Track** Two options track or Independent
 - **Track Offset: 0** -37 to +25 range of adjustment
 - **Return** Steps back to More function menu
- **Return:** Steps back to the Primary functions menu.

System Setup

System Setup Set Clock

The System Setup menu is entered by pushing and holding the Multi Jog for > 10 seconds. Rotating the Multi Jog displays the next System Setup function in the list:

- **Set Clock**
- **Presets**
- **Restore Defaults**
- **Setup Lockout**
- **Return**

Set Clock:

The clock is 24-Hour mode, and is set by first adjusting the hours, then minutes and finally the day, after which the menu escapes back to 'Set Clock'.

Set Clock
| 14 | : 45 Thu

Presets:

Presets can be created, Alarm Clock and Paging preset programmed.

Presets
Clear alarms

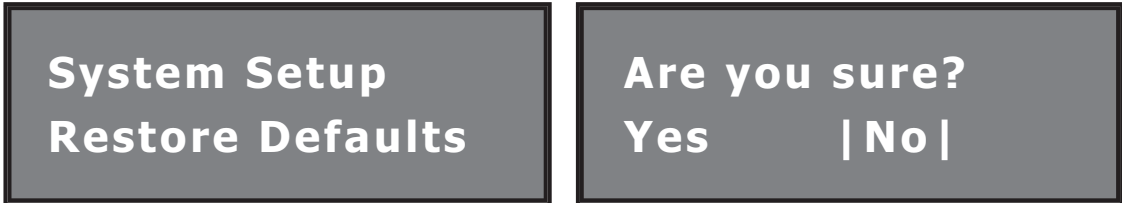
The menu has the following selections:

- **Clear alarms** Deletes all Alarm Clock programming
- **Preset 1** Creates preset 1. The following setup is the same for all other preset:
 - **Set Alarm** Sets the time and day(s) the alarm is to operate
 - **Alarm Enable** Activates the alarm
 - **Set up Preset** Displays a Preset version of the Primary functions menu where function values are adjusted. Select PS 1 to save and exit.
 - **Room Selection** Rooms may be excluded from the preset
 - **Return** Escapes to the Preset Menu
- **Preset 2** Creates preset 2
- **Preset 3** Creates preset 3
- **Preset 4** Creates preset 4
- **Preset 5** Creates preset 5
- **Preset 6** Creates preset 6
- **Page Preset** Creates page preset
- **Return** Escapes to the Setup Menu

Menu Navigation – Continued

Restore Defaults:

Clears the amplifier memory deleting Zone assignments, Room names, Zone Linking, Maximum Volume Limits, Bass, Treble & Balance adjustments, Loudness settings, Preset and Alarm clock and Preset programming. Select Yes to Restore Defaults.



Setup Lockout:

Locks access to the System Setup and More menus where installation critical adjustments can be made.



To clear the Setup lockout enter, enter the Setup Menu by holding down the multi Jog for > 10 seconds and enter the password: **1396**



Return:

When entered returns to the 'Primary Functions' menu

Protection

If the 450 series amplifier is operated in a confined space and in very high ambient temperatures the thermal protection may activate. Upon activation a protection message and temperature is displayed.

- Protection: 100°C All zones have volume reduced 20dB
- Protection: 105°C All zones are shutdown until the temperature reduces below 50°C

The message is cleared either when the multi jog is pressed, or when the temperatures normalise.



Programming Using MC

Overview

MC is an amplifier setup program.

Full control and tracking of any 450 series amplifier zone is provided.

The program runs on PC's running Win 2000 - Win XP operating systems, and communicates via either RS232 or USB. When a 450 series amplifier is first attached to a PC running MC the clock is automatically set to the PC's current time, date and location.

A Keypad controller connected to the amplifier may also be controlled by MC.



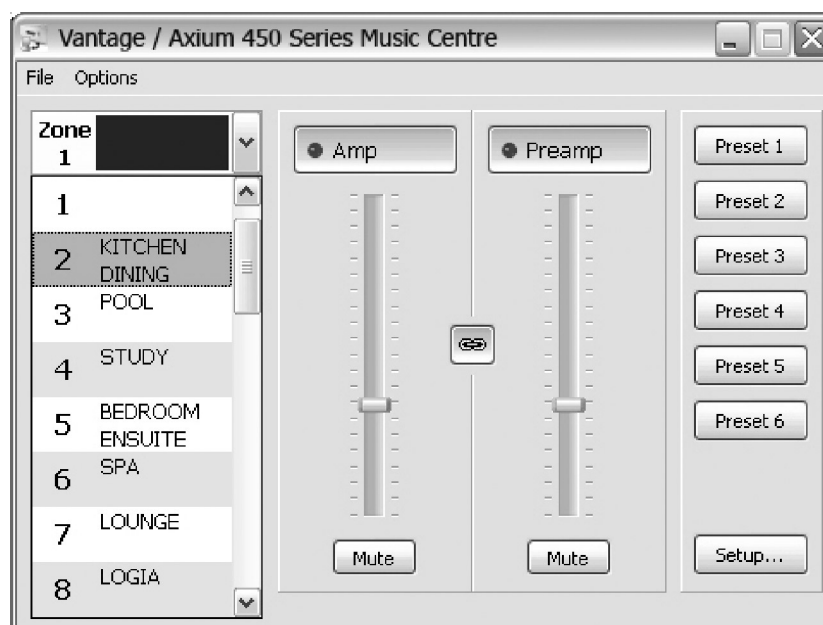
Main Window

MC's main window provides most of the user functionality required for real-time access and control of any amplifier zone.

The file menu contains the "New Window", "Keypad Window", "View Amplifier Log", "Upload Sound", and "Exit" commands.

- **New Window:** Opens another instance of MC's main window. This is useful for displaying and controlling multiple zones simultaneously.
- **Keypad Window:** A keypad window is displayed where a user can cause the selected keypad on the network to emit its stored IR strings.
- **View Amplifier Log:** Displays all historical temperature events and the time and date they occurred.
- **Upload Sound:** Direct MC to the file location of suitable "wav" files. Click Open to upload the file to the amplifier.
- **Exit:** Shuts down MC.

The Option Menu contains the port assignments. The program lists the detected ports on the PC/ Laptop. Select either USB or a suitable COM port for RS232.



Zone Select:

To select the zone move the cursor over the zone tab's down arrow and left click. A zone list window appears - make the selection with a left mouse click.

Placing the cursor over the zone tab's room description displays information about the amplifier's device ID / serial number.

Zoned Functions:

- **Standby:**

On, Off control of the amplifier or preamplifier is achieved by a left click over the standby buttons. The blue LED and the button shading indicate 'On' status.

The standby buttons may be named with the room name:

A name edit window is opened by a right click above the standby Button, enter the new text and click OK to save and exit.

The room name is transferred to the amplifier.



- **Mute:**

A left mouse click above the mute button mutes the amplifier or preamplifier, a further left click un-mutes it.

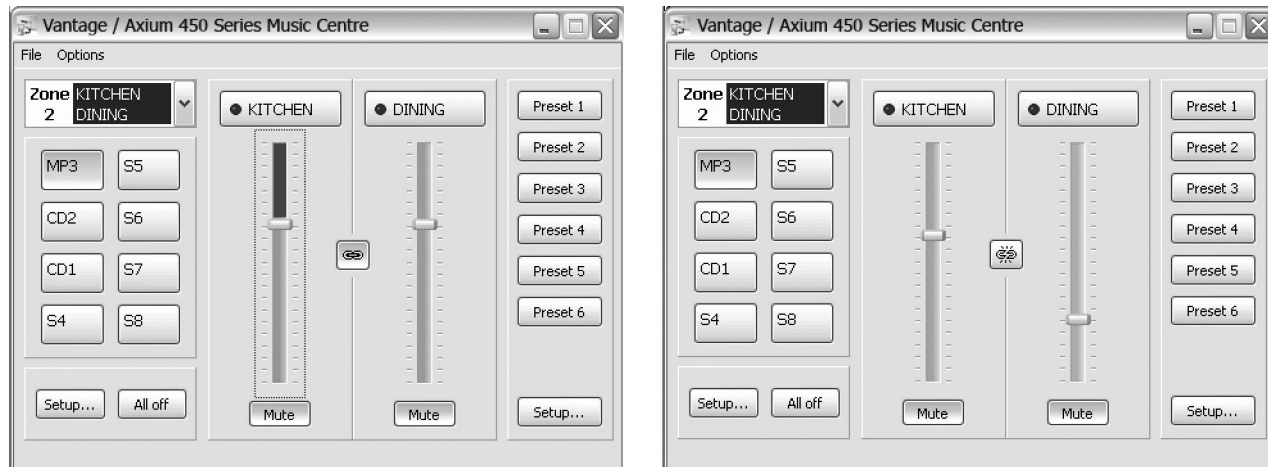
- **Source Selects:**

One of eight sources (S1 – S8) may be selected – the button shading indicates the selection. A source's name may be changed with a right click over the source select button:

A name edit window appears and new text entered.

The short label (limited to 3 characters) appears on the amplifiers front panel, while the Label is displayed in MC.





- **Volume Levels**

The volume sliders may be changed either by left clicks above or below the displayed level, or by dragging the level down using a left click and hold.

Note: If the preamplifier is in 'Tracking' mode then changing one volume changes the other.
- **Maximum Volume Limit**

The maximum volume limit is set firstly by identifying the slider with a left mouse click, then on the keyboard hold down the 'Shift' key and adjust the level using the 'Up' and 'Down' keys. The limit is indicated above the slider level by a black bar as shown above in the Kitchen's volume slider.
- **Preamplifier Tracking / Independent Mode**

The chain link button between the volume sliders is used to toggle the preamplifier volume tracking mode. When the chain symbol is unbroken the preamplifier volume tracks the amplifier volume. An offset between the preamplifier and amplifier volume may be made by identifying the volume bar to be changed with a left click, then make the change on the keyboard by holding down the 'Ctrl' key and adjust the level using the 'Up' or 'Down' keys.

When the chain link button is broken, the preamplifier is in 'Independent' mode.

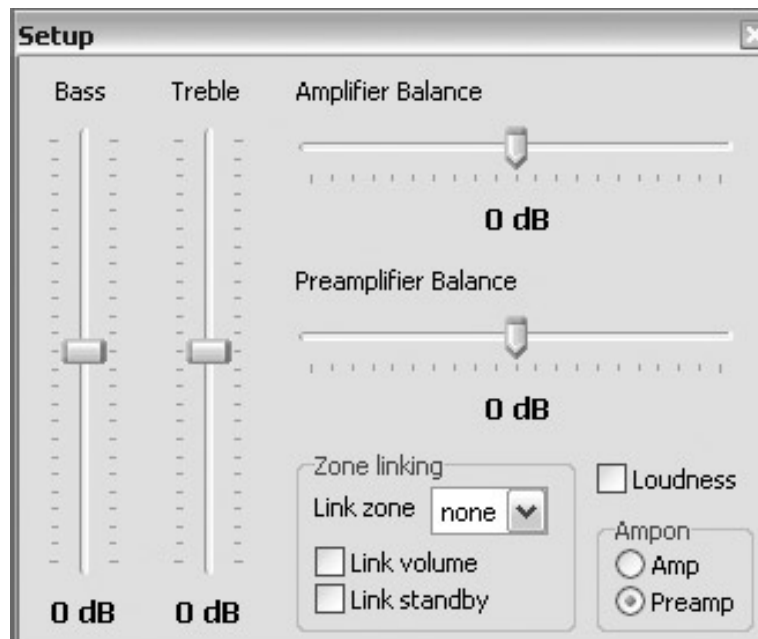
While in independent mode the preamplifier volume may be adjusted independently from the amplifier volume with one restriction: the maximum difference in volume between the preamplifier and amplifier is 34dB or 68% of the volume range.
- **All Off**

Left mouse click above the "All OFF" button turns all zones OFF
- **Setup**

Opens the Setup Window giving access to the occasionally used functions.
- **Preset 1 –6**

These are used for creating scenes and alarm clock events
- **Preset Setup**

Opens the Preset Setup Window where the alarm clock & presets are programmed.



Setup Window

The window provides the means to control the occasionally used functions like bass, treble, amplifier and preamplifier balance and loudness. These are all adjusted using a left mouse click while above the button or slider.

Note: The preamplifier and amplifier share the same bass & treble control.

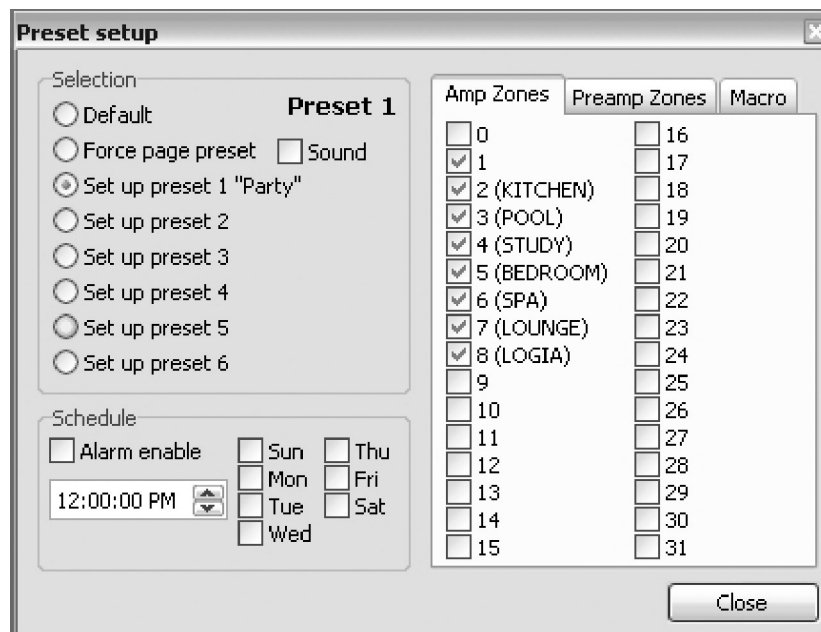
Loudness is defeated when the preamplifier is set to "Independent Mode".

Any one zone may be linked to one other zone by left clicking the "Link Zone" down arrow, and making the selection from the zone list. Linked zones have the same source selection.

Volume and standby may also be linked using the "Link Volume" & "Link Standby" tabs.

If both volume and standby are selected then the two zones are fully linked and completely mimic each other.

The "Amp On" output's on the 450 series amplifier default to tracking the preamplifier, however when in Independent mode it may be useful for the zones 'Amp On' output to be assigned to the amplifier. Select using a left click on the Amp tab.



Preset Setup Window

Preset Programming

Presets are all zone functions. There are six preset buttons – Preset 1 - Preset 6.

These presets are stored in the amplifier, and may be setup using the MC setup window.

Left click over "Set up preset 1" and change any function i.e. On status, volume level, source selection, bass, treble etc. If Preset 1 is required to effect changes to the other zones then either change the main window's zone or open other MC main window instances and make the required changes. Left click the "Default" selection to save and exit. Preset 1 is now programmed and will be set to the programmed preset states whenever the Preset 1 IR control string, or RS232 command is received. The process is the same for all other presets.

The Preset may be re-named – Right click on the Preset button in MC's main window: Opens the name edit window.
Enter the new text and click OK to save and exit.
The name is also added next to the "Set up preset" in the Preset Setup Window.

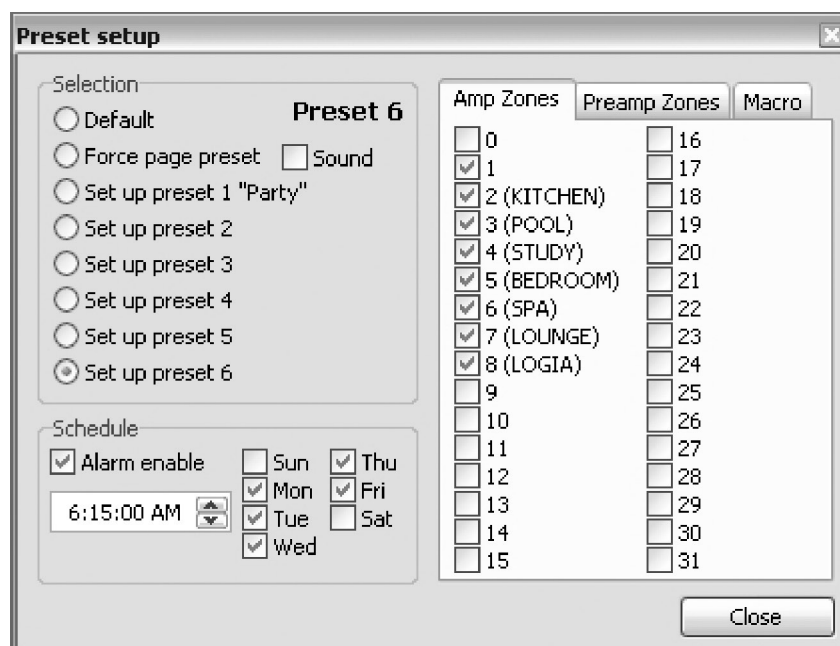


Page Preset

Left click the "Force page preset" and make changes to zone settings in MC's main window. Click "Default" to save and exit.

If a door bell sound has been uploaded to the amplifier, then it may be optionally included in the preset by clicking the "Sound" tab. All zones will be automatically set to input S8.

Whenever a contact across the PG and 0V terminal is closed the amplifier will assume the programmed states, and if "Sound" was selected the uploaded wav file will be played in a continuous loop for the duration of the contact closure. When the contact opens the amplifier reverts to its previous settings.



Alarm Clock programming

An alarm clock event may be included in a preset.

In the Preset Setup window left Click a spare "Set up preset" – for this example Preset 6 is selected.

Left click the "Alarm Enable" in the Schedule panel.

Select the required time and days that the Alarm is to operate and change all the required settings in MC's main window i.e., which zones are ON, their volume and source selection etc.

Left click the "Default" selection to save and exit.

The preset 6 command will then be invoked at 6:15 in the morning Monday - Friday.

To turn the alarm clock off select 'Setup Preset 6' and in the Preset Schedule panel de-select the Alarm Enable. Left click the "Default" selection to save and exit.

Source Control Alarm Clock programming

If an AX-KPB keypad is connected to the 450 series amplifier then source control can also be included in an Alarm preset.

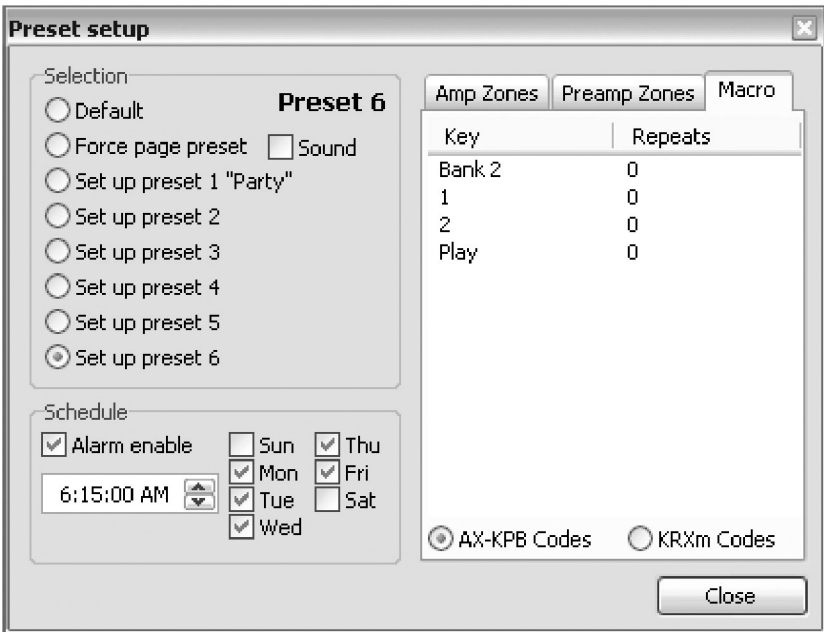
In MC's main window; file open an AX-KPB keypad Window.

Select the connected Keypad's zone in "Zone" tab.

If the Keypad is controlling a Preamplifier zone (which is in Independent Mode) then Left click "Preamp"

Left clicks on the AX-KPB buttons cause the connected Keypad to send the buttons learnt IR commands.

"Repeats" determine how many times the IR command is sent on each button click.



In the preset setup window select 'Macro'.

On the AX-KPB Keypad window left click the required AX-KPB functions, i.e. 'CD1', '1', '2', 'Play'.

The above sequence is entered into the macro window. Save and exit by selecting 'Default'.

The system is now programmed to select CD1, and on the CD player play disc 12 at 6:15am Monday through to Friday.

Specifications

Amplifier Section

Rated Output Power (FTC)

All Channels:

50 Watts minimum continuous power / channel, 8 ohm loads,
65 Watts continuous power / channel, 6 ohm loads,
2 Channels driven @ 1KHz, with a maximum harmonic distortion of 0.05%

THD (Total Harmonic Distortion)

0.05% (Rated Power)

Damping Factor

60

Speaker Impedance (Z1 – Z4 L/R)

6Ω - 16Ω

Input Sensitivity and Impedance

(S1 – S7 L/R & S8 mono)

0.72 V / 22KΩ (Unbalanced)

Preamplifier Output Level

and Impedance (Z1 – Z4 L/R)

+16dB / 680Ω

Frequency Response

30Hz – 50KHz / +1dB – 3dB (8Ω)

Tone Control

±10dB, 100Hz (Bass)

±10dB, 10KHz (Treble)

Signal to Noise Ratio

92dB (IHA-A, 1V input / unbalanced)

Video Section

Input Level & Impedance (S1 – S8)

1 Vp-p / 75Ω (Composite)

Buffered Video Output Level

and Impedance (S1 – S8)

1 Vp-p / 75Ω (Composite)

Output Level & Impedance (Z1-Z4)

1 Vp-p / 75Ω (Composite)

Interface

IR Output

A, B, IR1, IR2 – 3.5mm phone Jack

Expansion Bus

Input & Output - 34 way 0.1" Double Row Header

12V DC 1 Amp Power

Two DC power sockets, Center positive (2.1mm pin diameter)

RS232

One DB9 – 9600 Baud

USB

One : USB mini-B 5 pin

Controller

Two: 4 way terminal blocks (0V, IR, 12V & Data).

Amp On Control

One: 7 way terminal plug with Amp ON 1 – 4 and #

One Page Preset Contact closure Input – PG.

General

Power Supply

451AV

AC 120 V, 60Hz

452AV

AC 230 V, 50Hz

Power Consumption

451AV

4A

452AV

2A

Standby Power Consumption

21.4W

Dimensions

435 x 140 x 390 mm

17-1/8" x 5-1/2" x 15-3/8"

Weight

13.5kg (29.8lbs)

Specifications and features are subject to change without notice.