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MC²

AUDIO

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An example of this equipment has been tested and found to comply with the following European and international Standards for Electromagnetic Compatibility and Electrical Safety:

Radiated Emissions (EU): EN55013-1 (1996)
RF Immunity (EU): EN55103-2 (1996) RF Immunity, ESD, Burst Transient, Surge, Dips & Dwells
Electrical Safety (EU): EN60065 (1993)



Important Safety Instructions

- Read the instructions.
- Keep the instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with manufacturer's instructions
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that create heat.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and at the point where they exit from the apparatus.
- Only use the attachments/accessories specified by the manufacturer. Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when 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.
- The mains switch on the amplifiers only switches one pole of the mains supply, therefore for units with a detachable cord to be fully disconnected from the mains, the mains disconnect device (i.e. mains plug or mains coupler) should remain readily operable. For units with a fixed mains lead the external all pole circuit breaker with 3mm breaking distances is the disconnect device and therefore the installation of the amplifier shall be carried out in accordance with all the applicable installation rules.

- Lire les instructions.
- Conserver les instructions.
- Respecter tous les avertissements.
- Suivre les instructions.
- Ne pas utiliser cet appareil près de l'eau.
- Nettoyer uniquement avec un chiffon sec.
- Ne pas obstruer les ouvertures de ventilation. Installer l'appareil conformément aux instructions du fabricant.
- Ne pas installer près d'une sources de chaleur tels que radiateurs, bouches d'air chaud, poêles ou autres appareils (y compris les amplificateurs) qui créent de la chaleur.
- Protéger les cordons d'alimentation contre le pietinement et le pincement, particulièrement au niveau des fiches, des prises de courant, et à l'endroit où ils sortent de l'appareil.
- Utiliser uniquement les pièces de fixation et accessoires spécifiés par le fabricant.
- Débrancher cet appareil pendant les orages ou lorsqu'il n'est pas utilisé pendant un long moment.
- Confier toute réparation à un personnel qualifié. Le retour au service après vente est nécessaire lorsque l'appareil est endommagé de quelque façon que ce soit, tels que : cordon d'alimentation ou fiche endommagée, liquide renversé à l'intérieur, objets tombés dans l'appareil, exposition à la pluie ou à l'humidité, ne fonctionne pas normalement, ou s'il est tombé.
- L'interrupteur principal sur les amplificateurs ne coupe qu'un pôle de l'alimentation secteur. Le cordon IEC permettra de déconnecter l'appareil de l'alimentation secteur, pour cette raison l'accès à ces fiches (fiche mâle ou femelle) doit être facilités. Pour les appareils avec un câble d'alimentation fixe sans fiche secteur, le dispositif de coupure omnipolaire ayant une distance d'ouverture de contact d'au moins 3mm, sera le dispositif permettant la déconnexion complète de l'appareil. Pour cette raison l'installation et le raccordement de l'amplificateur devra ce faire conformément au réglementation en vigueur.



CAUTION: RISK OF ELECTRIC SHOCK.
DO NOT OPEN.



ATTENTION: RISQUE DE CHOC ELECTRIQUE.
NE PAS OUVRIR.

WARNING: THIS APPARATUS MUST BE EARTHED.
AVERTISSEMENT: CET APPAREIL DOIT MIS A LA TERRE.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK.
DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.
AVERTISSEMENT: POUR REDUIRE LE RISQUE D'INCENDIE OU DE CHOC
ELECTRIQUE. N'EXPOSEZ PAS CET APPAREIL A LA PLUIE OU A L'HUMIDITE.

CAUTION: TO REDUCE THE RISK OF FIRE REPLACE THE FUSE WITH THE SAME
TYPE.

ATTENTION: POUR REDUIRE LE RISQUE D'INCENDIE REMPLACEZ LE FUSIBLE
AVEC LE MEME TYPE.

CAUTION: NO USER SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

ATTENTION: AUCUNE PIECE N'EST REMPLACABLE PAR L'UTILISATEUR.
POUR L'ENTRETIEN REFEREZ-VOUS A UNE PERSONNE DE SERVICE QUALIFIEE.

This unit is fitted with a 3-wire power connector. For safety reasons, THE EARTH LEAD SHOULD NOT BE DISCONNECTED IN ANY CIRCUMSTANCE. If ground loops are encountered consult the section on input connections later in this manual.

WHERE A FIXED MAINS LEAD IS FITTED, THE WIRING COLOURS ARE:

230V AREAS:	EARTH	=	GREEN & YELLOW
	NEUTRAL	=	BLUE
	LIVE	=	BROWN

120V AREAS:	EARTH	=	GREEN
	NEUTRAL	=	WHITE
	LIVE	=	BLACK

DO NOT PLACE OBJECTS CONTAINING LIQUID ON TOP OF THE APPARATUS.

DO NOT USE THE UNIT IF THE ELECTRICAL POWER CORD IS FRAYED OR BROKEN. The 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 and plugs and the point where they exit from the appliance.



Thanks

Thank you for choosing an MC² *Ti Series* amplifier for your application. Please spend a little time reading through this manual, so that you obtain the best possible performance from the unit.

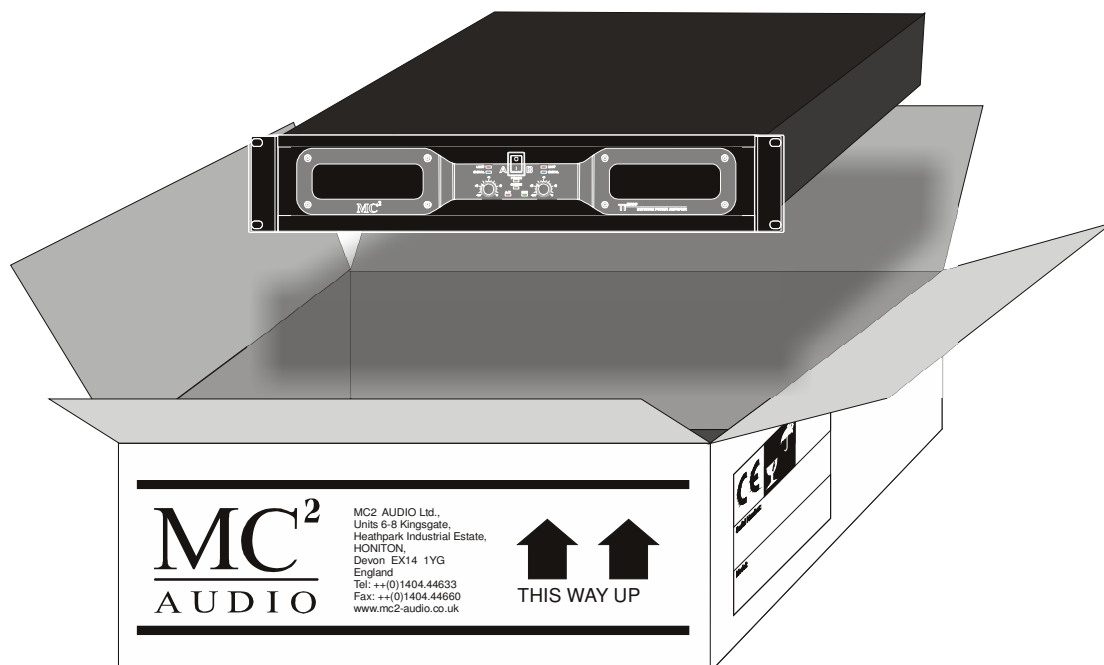
All MC² products are carefully designed and engineered for cutting-edge performance and world-class reliability. If you would like further information about this or any other MC² product, please contact us.

We look forward to hearing from you in the near future.



Unpacking the amplifier

After unpacking the unit, please check it carefully for any damage. If any is found, immediately notify the carrier concerned - you, the consignee, must instigate any claim. Please retain all packaging in case of future re-shipment.



Introduction

Your *Ti Series* power amplifier is a no compromise, high quality, class AB power amplifier. There is no dynamic switching of the audio or power rails (a very common method of achieving extra power at the expense of audio quality) thus ensuring optimum sonic performance.

Fan speed is varied as required to keep the amplifier within its temperature limits. Signal limiters are included to protect speakers from clipped signals.

The amplifiers include full DC and short circuit protection to ensure trouble-free service even in 'harsher' environments.

Additionally, the amplifiers have sophisticated microprocessor control enabling remote monitoring of the amplifier's operating state through **iCORE**, and remote control of many of its features, including gains, mutes, mode and standby condition.

A programmable GPIO port allows for local (non-PC based) remote control of a variety of functions, in addition to either remote load monitoring, or with no computer connected, local load monitoring and reporting.

Installation

Electrical Considerations

The amplifier has been manufactured to comply with your local power supply requirements, but before connecting the unit to the supply, ensure that the voltage (printed on the rear panel) is correct, and that a mains fuse of the correct type and rating has been fitted.

Make sure power outlets conform to the power requirements listed on the back of the unit. Damage caused by connecting to improper AC voltage is not covered by the warranty.

Mechanical Considerations

To ensure that this equipment performs to specification, it should be mounted in a suitable rack or enclosure as described below. Like all high power amplifiers, it should be kept away from other equipment that is sensitive to magnetic fields. Also, this amplifier may suffer a substantial reduction in performance if it is subjected to, or mounted close to, equipment which radiates high R.F. fields.

When mounting the amplifier in a rack or enclosure, ensure that...

- ✓ ...the rear of the unit is adequately supported. The brackets supplied fit standard 19 inch (483mm) rack mounting systems.

THE FRONT PANEL IS NOT CAPABLE OF SUPPORTING THE UNIT ON ITS OWN.

- ✓ ...there is adequate ventilation. The cooling fans suck cool air in through the front and blow hot air out at the rear of the unit through the ventilating grills. Take care when mounting other equipment in the same rack.

IF THIS AIR IS NOT ALLOWED TO ESCAPE, OVERHEATING WILL OCCUR.

Please also refer to the maintenance section on page 61 of this manual.

Operation

Read all documentation before operating your equipment and retain all documentation for future reference.

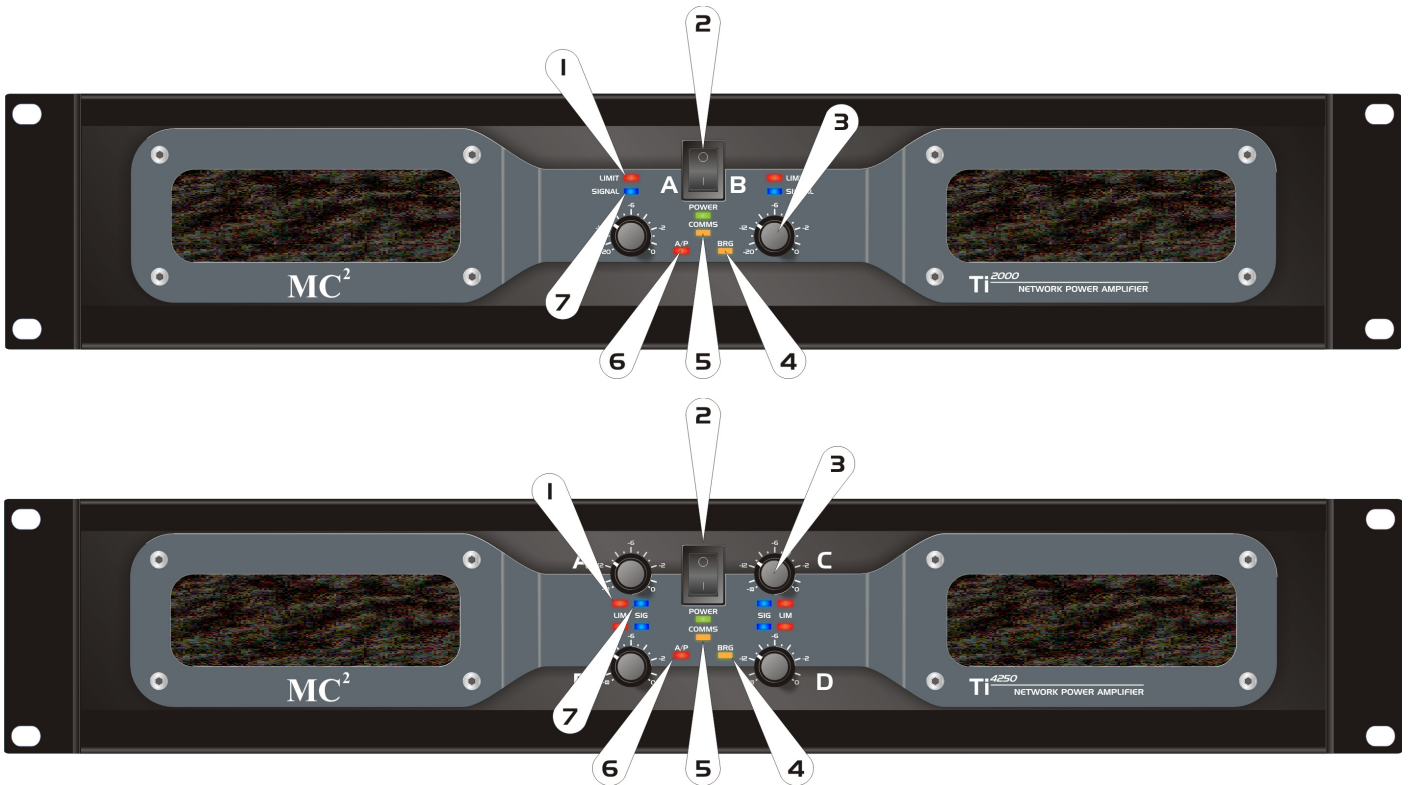
Do not spill water or other liquids into or on the unit and do not operate the unit while standing in liquid.

Do not block fan intake or rear ventilation outlets or operate the unit in an environment that could impede the free flow of air around the unit.

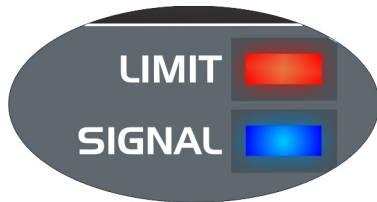
If the unit is used in an extremely dusty or smoky environment, it should be cleaned of any collected debris at regular intervals. (Please also refer to the maintenance section on page 61 of this manual.)

It is important that the power output of your amplifier is matched to the power handling capacity of your loudspeaker. If not, damage to the loudspeaker could occur.

Front Panel Controls and Indicators

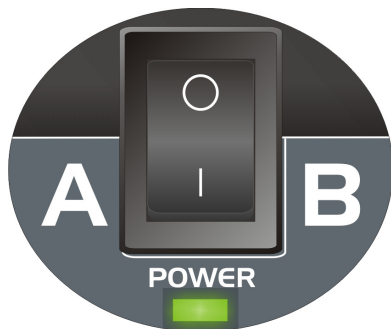


1: Limit Indicators



The **Ti Series** amplifiers incorporate signal limiters, which are preset to prevent clipping with high levels of drive. The LEDs on the front panel illuminate to indicate operation of the limiters.

2: Power Switch



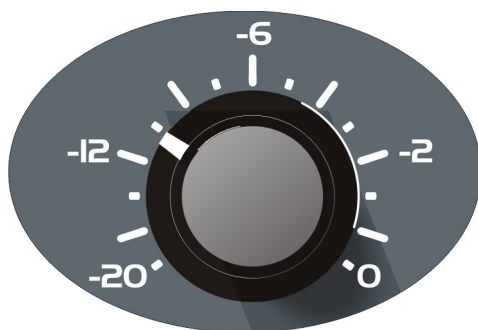
This switch turns off the amplifier completely, by switching off the auxiliary supply that is responsible for keeping the microprocessor alive when the main amplifier is in standby mode. A green LED is visible through the right hand ventilation hole when the amplifier is connected to the mains and turned on.

The "POWER" LED on the front panel will be red if the amplifier is in standby, and green when active.

At 'switch-on' the "POWER" LED will begin to flash red/amber until the power on delay time has expired, at which point the amplifier will fully activate, and the LED will turn green. This power on delay is remotely programmable from 0 to 60 seconds to allow racks of amplifiers in the same location to be power sequenced, preventing unnecessary in-rush surges and unwanted circuit breaker tripping. Please see the section on page 35 in this manual about adjusting amplifier properties remotely.

Once the amplifier has started, the protection circuit will initially activate, illuminating its accompanying "A/P" (Audio Protect) LED, whilst the circuits stabilise. This will then extinguish, and the speaker relays will engage, connecting the amplifier outputs to the load(s). Assuming no faults are detected, after a few seconds only the "POWER" LED (and signal indicators if signal is applied) will be illuminated, along with possibly the "BRIDGE" LED and "COMMS" LED if under remote control.

3: Level Controls



These are analogue controls allowing precise level settings. The remote level control available through **icORE** is in series with these potentiometers, so be sure to have them set to maximum (0dB is fully clockwise) if full amplifier output at the rated sensitivity is to be achieved.

Note that in bridged mode only channel A's control is active.

To prevent unwanted tampering, these controls may be disabled internally by adjustment of jumpers. Please refer to page 49 for details of how to do this.

Remote control of the amplifier's gain is possible through **icORE**, along with muting and "soloing" of any individual output on the system. This is covered in the section on page 22 - remote control and monitoring.

4: Bridged Mode Indicator



This indicates the mode as selected by the switch on the rear panel and is illuminated when bridged mode is active. This is also adjustable by remote control.

5: Comms Indicator



If the amplifier is connected for remote control, and receives commands addressed to it, this indicator will flash. It will be yellow for messages that are replied to, and occasionally may flash green for global messages that do not require a reply.

6: A/P (Audio Protect) – Fault Indicator



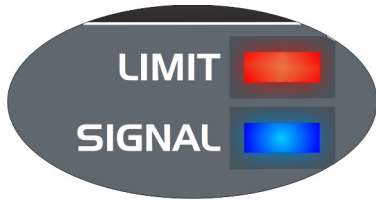
If the outputs are shorted or if DC is present, the protection circuit will disengage the outputs and the "A/P" LED will illuminate. The amplifier will continue to be monitored and depending on the type of fault, will either reset after the fault has cleared or require manual resetting by switching off at the mains switch and then on again after a few seconds.

Temperature related faults will reset if the unit has cooled sufficiently.

Output short circuits will require manual reset after clearing the fault.

Please note that it is quite normal for the "A/P" LED to illuminate for a short during start-up or coming out of standby mode.

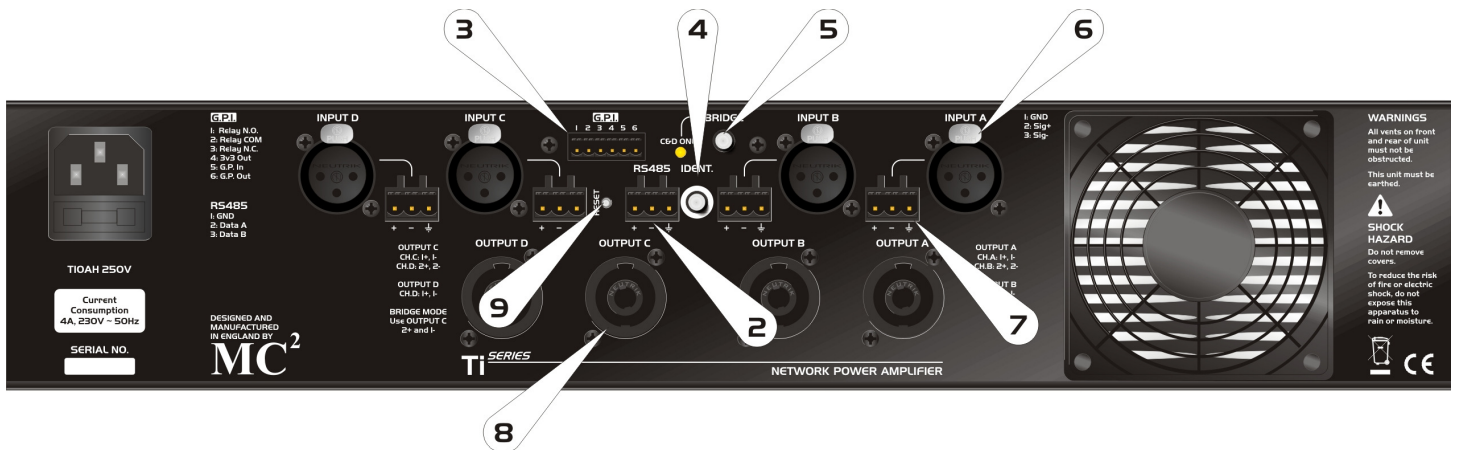
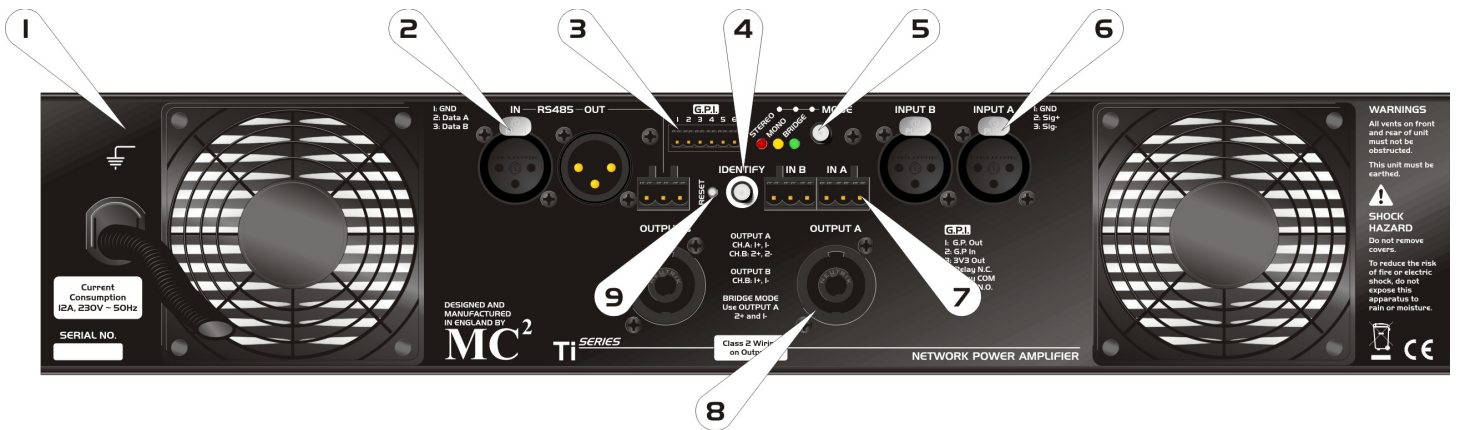
7: Signal Indicators



These are active from a minimum output level of approximately 10 Watts and are an indication only of signal presence.



Rear Panel Controls, Connections and Indicators



1: Internal Safety Earth Connection

This earth point may be used as a common ground within a rack of equipment.
(Not fitted to Ti-4250.)

2: RS485 Comms Connections



Remote control connections are either via the pair of XLR sockets, wired as follows:

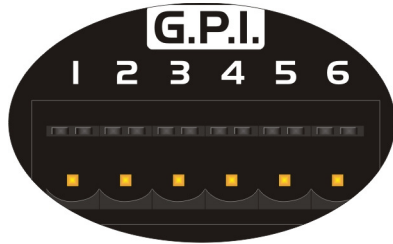
- Pin 1: Shield/Ground
- Pin 2: Data A (+)
- Pin 3: Data B (-)

or using a direct parallel connection to the single "Phoenix" connector

(Ti4250) , which is wired the same way as the XLR connections. For details of setting up remote control, or connecting to a Breakout box running in master mode (for automatic system monitoring), please see the section on page 22 of this manual.

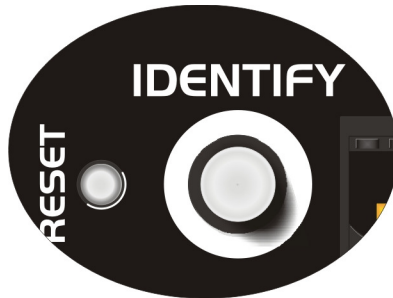
3: General Purpose Interface Port (GPI)

This mini-“Phoenix” connector provides a selection of programmable pins to allow for basic remote control of several amplifier features and the ability to remotely report certain error conditions in the absence of either a Breakout master, or a computer running **iCORE** for monitoring.



Please see the section on page 38 for details of all the programming options available and examples of various remote options.

4: Identify Switch



This momentary action switch is used in conjunction with **iCORE** to easily identify amplifiers remotely on the network.

Within the **iCORE** software, pressing this switch will cause the amplifier's “panel” to flash on screen, along with the “POWER” LED on the front panel turning amber and flashing for five seconds, before turning red or green again (depending on active/standby status).

Even when not connected to the remote software, the LED will still flash (along with the Mono and Stereo LEDs on the rear), aiding identification when trying to locate connections/diagnose problems in a large rack of units.

This switch is also used to force the amplifier into “boot load” mode to upgrade the internal firmware. Normally, this can be achieved though **iCORE** directly, but in certain circumstances, or if **iCORE** is not installed on a local computer, a basic terminal based firmware upgrade is still possible. Please see the section entitled “Recovery Update Procedure” on page 58 for more information.

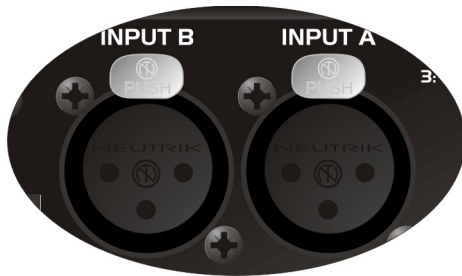
5: Mode Switch



This momentary action switch cycles through the three amplifier modes, illuminating the accompanying mode LED as appropriate:
Mono Mode – Yellow LED
Stereo Mode – Green LED
Bridge Mode – Red LED (and front panel LED)

This mode is automatically stored by the microprocessor. It is also adjustable by remote control. (Ti4250 – Bridge/Stereo only – single yellow LED indicates Bridge mode)

6: Audio Input XLR Connections



The inputs are made via 3-pin XLR connectors along with "Phoenix" connectors (wired directly in parallel), which are electronically balanced and should be connected via a high grade twin core screened cable, as follows:

PIN1: Screen (see note on next page)
PIN2: Hot (signal +)
PIN3: Cold (signal -)

The amplifier is designed to operate with fully balanced equipment and ground loops or loss of performance may be experienced if connected to unbalanced sources. If it is unavoidable however, the following wiring should be used. The cable should still be twin core plus screen.

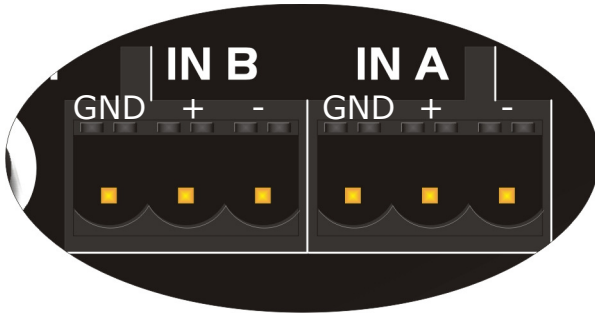
PIN1: Screen - connected to the chassis of the unbalanced equipment - or left disconnected at the unbalanced end.
PIN2: Signal Hot
PIN3: Signal Cold

NOTE: This amplifier is wired to the latest industry recommendations. PIN1 is connected directly to the chassis/mains earth. If ground loops (mains hum) are encountered remove the screen connection from the other end of the cable and leave it open circuit. If problems persist, consult your dealer/supplier.

DO NOT TAMPER WITH OR ALTER ANY GROUND (EARTH) CONNECTIONS INSIDE THE AMPLIFIER!

For bridged operation input should be made to channel A only and the rear panel mode switch pressed to select bridged mode.

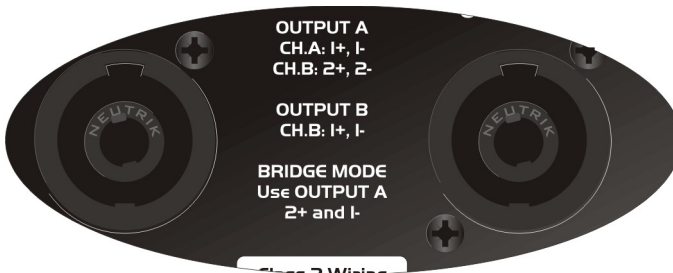
7: Audio Input "Phoenix" Connections



The "Phoenix" audio connectors are simply wired in parallel with the XLR connectors, and should be connected as follows, (left to right):

- PIN1: Screen
- PIN2: Hot (signal +)
- PIN3: Cold (signal -)

8: Speaker Output Connections



The speaker outputs are via Neutrik Speakon connectors. 2 pole (NL2FC) or 4 pole (NL4FC) connectors can be used.

Terminations are as follows :-
PIN1+: HOT
PIN1-: COLD

Additionally Channel A Speakon connector carries Channel B output on Pins +2 & -2 to allow easy bi-amping or bridged operation.

Ti-4250: Channel C's Speakon carries both channel C and channel D on +1 and -1 (Ch.C) and +2, -2 (Ch. D).

Safety notes about the speaker output connections



There must be no shared connections between channels.



As the currents involved are very high, the speaker cables should conform to the following minimum requirements, otherwise the losses will cause the cables to get hot and audio power will be reduced:

T2000, 16A: T3500, 20A - into 4 ohm speaker loads



Do not connect the inputs/outputs to any other voltage source such as a battery, mains source or power supply, regardless of whether the amplifier is turned on or off.



Do not run the output of any amplifier channel back into another channel's input and do not parallel or series-connect an amplifier output with any other amplifier output.

Bridged (Mono) Operation

Supply the signal to Channel A input only & select "Bridge Mode" by pressing the "MODE" switch until the "Bridge" LED is illuminated.

Use Channel A Output Speakon connector and connect as follows:

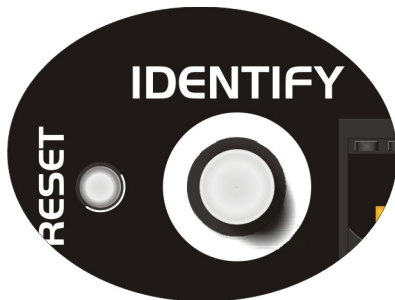
PIN 2+: HOT
PIN 1-: COLD

Ti-4250: Bridge mode only operable on channel C&D, using channel C's Speakon

PIN 2+: HOT
PIN 1-: COLD

When operating in bridged mode, the minimum impedances are doubled. The minimum load in bridged mode is: 8 ohms - T3500, 4 ohms - T2000.

9: *Reset Switch*



This recessed momentary action switch is used to reset the amplifier back to default settings. Please see the section on page 53 for more information.

Remote Control and Monitoring

Overview

There are three distinct methods of remote control available to the **Ti Series** amplifiers, allowing for various levels of system complexity. These may be thought of as:

- Basic Local System Control
- Remote Monitoring and Control *On-line* via a Computer with **iCORE**
- Remote Monitoring *Off-line* with a Breakout Box

These three methods can all be mixed, and are not mutually exclusive – so we can have local control of an amplifier’s muting, but still be connected to a PC with **iCORE** if required.

When the PC isn’t in use, the system can also be connected to a Breakout box for off-line background monitoring, and all without reconfiguring any cables!

Basic Local System Control

The basic local control is all based around the use of the GPIO port to allow amplifier(s) to be either muted, placed into standby, or have their gains adjusted – the required input control is programmed via **iCORE**. Monitoring via a simple logic output can be programmed, again via **iCORE**, and allows for checking of the amplifier loads, protect status, excess limiting, or over-temperature conditions. An additional isolated changeover relay can be used when the 3v3 logic isn’t compatible with the required control system.

The setup and configuration of the amplifier is explained in the section entitled “Example Uses of the GPIO Port Lines” on page 38.

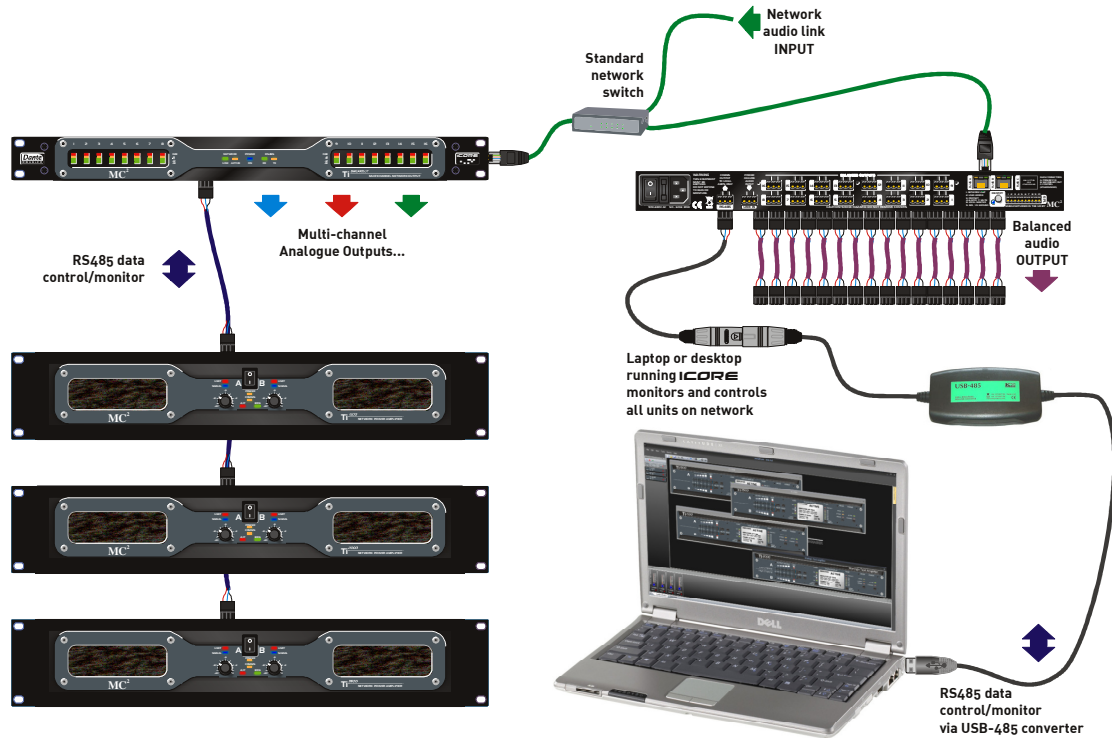
Note the following points about local control.

- ✓ Only one parameter can be controlled via the logic input.
- ✓ Only one parameter can be monitored via the logic output.
- ✓ Local control always takes precedence over the remote setting of the same parameter – so local gain control will take precedence over remote adjustments, and local muting will over-ride remote settings. This is to allow for building management systems to assume ultimate responsibility for the system, in emergency circumstances.

For an explanation on how to set up load monitoring, please see the section entitled “Load Monitoring – What For and How” on page 45.

Remote Control On-line via a Computer with **iCORE**

Amplifiers can be connected, via their RS485 port, directly to a computer running **iCORE**, allowing for comprehensive configuration of their properties, adjustment of various real time parameters, and monitoring of their operating condition.



We recommend the KK Systems USB-485 adapter for simple conversion to RS485.



This device is powered via the USB connection and so has the ability to drive long cable runs reliably. This device is available from us, or directly from KK Systems at www.kk-systems.com. The converter comes with a 9-pin D-type fitted as standard – this has to be adapted to an XLR connection.

To prevent voiding the warranty on the converter, we'd recommend not cutting the 9-pin off, but rather make up an adapter – the pin out for this is overleaf.

9-pin D type	XLR	Phoenix
Pin 4	1	1
Pins 3+7 (Brown + Orange)	2	2
Pins 8+2 (Black + Yellow)	3	3

Connect to the first amplifier via its RS485 input socket. To connect to further amplifiers, just use standard microphone leads and daisy chain in to out. Note that the RS485 Phoenix connector is wired in parallel with the RS485 XLRs, so these may be used instead – come out of the first amplifier on the Phoenix and simply parallel the three wires to the next device, and so on down the chain.

We recommend that you use screened cable for these connections and be sure to ground one end of the screen.

There is no need to set ID numbers or worry about master/slave settings or baud rates – the baud rate is preset and all amplifiers contain a serial number chip with a unique ID which is used to set the comms ID.

iCORE searches for all connected devices automatically. Once connected and all devices have been found, it will continuously monitor:

- ✓ Output voltages and currents (for load monitoring)
- ✓ Operating temperature
- ✓ Active time and power cycles
- ✓ Operating mode and limiter states
- ✓ Protection condition

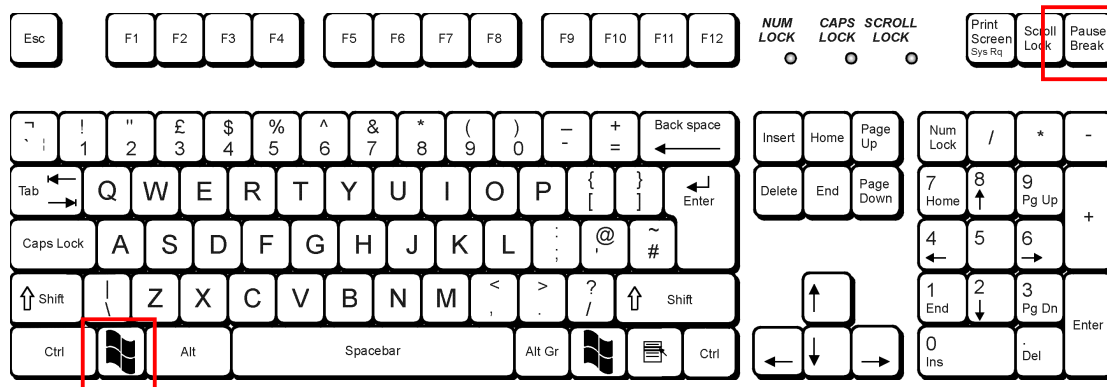
In addition to the real time monitoring and control, many properties of the connected devices can be selected through the software. It is also used to update the firmware in all connected devices and will issue warnings if the firmware is not up to date. The next section deals with the basics of actually getting **iCORE** running and how it all works.

Introduction to **ICORE** – a crash course (not literally)

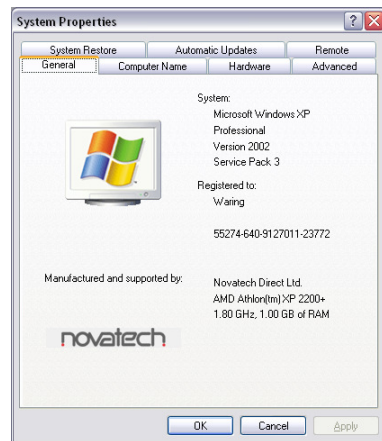
Going on-line for the first time

Having physically connected all devices to the computer through a suitable RS485 converter, and installed the software successfully, we now need to check the virtual COM port that the converter is using so we can match this with the COM port in **ICORE**.

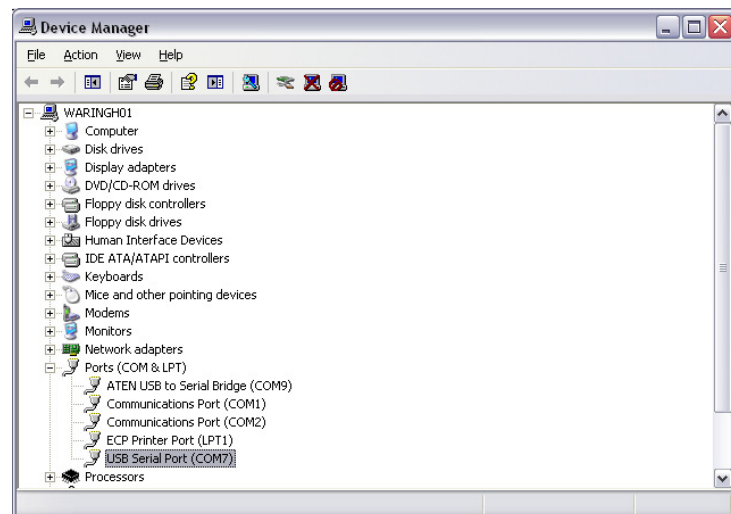
With the converter **plugged in (the COM port won't show up if the converter isn't connected!)** use the shortcut of the Windows key on your keyboard + the Pause/Break key to bring up the System properties window:



Press **BOTH** keys together! Alternatively you can get to the same place through **start** ⇒ Settings ⇒ Control Panel ⇒ System



Press the “Hardware” tab and then “Device Manager”. This will bring up a window with a list of all hardware subsections of your computer, including the COM ports. Expand the section entitled “Ports” and locate the USB-Serial adapter. The COM port number it has been assigned is in brackets after the name.

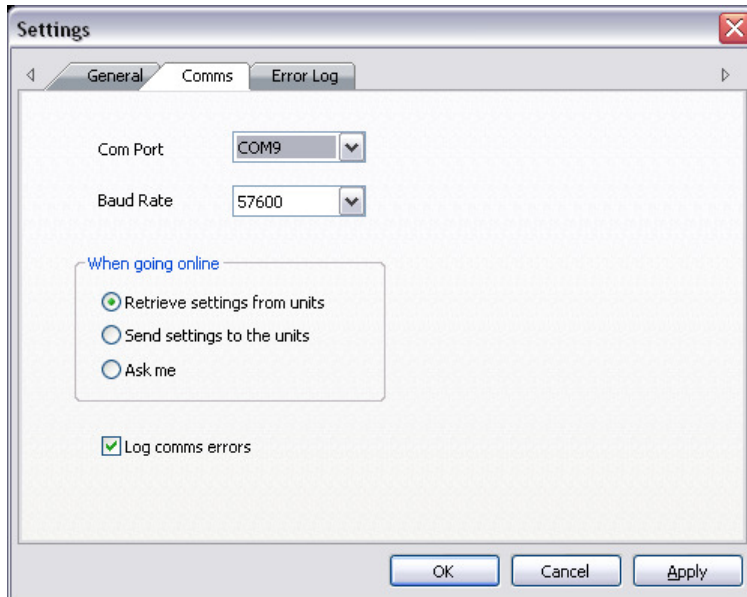


Make a note of this port number and then, open **ICORE**.

Expand the window to fill your screen and then, from the menus, choose Tools ⇒ Options, and select the Comms tab.



Make sure the COM port number selected from the drop down list matches the one discovered earlier.

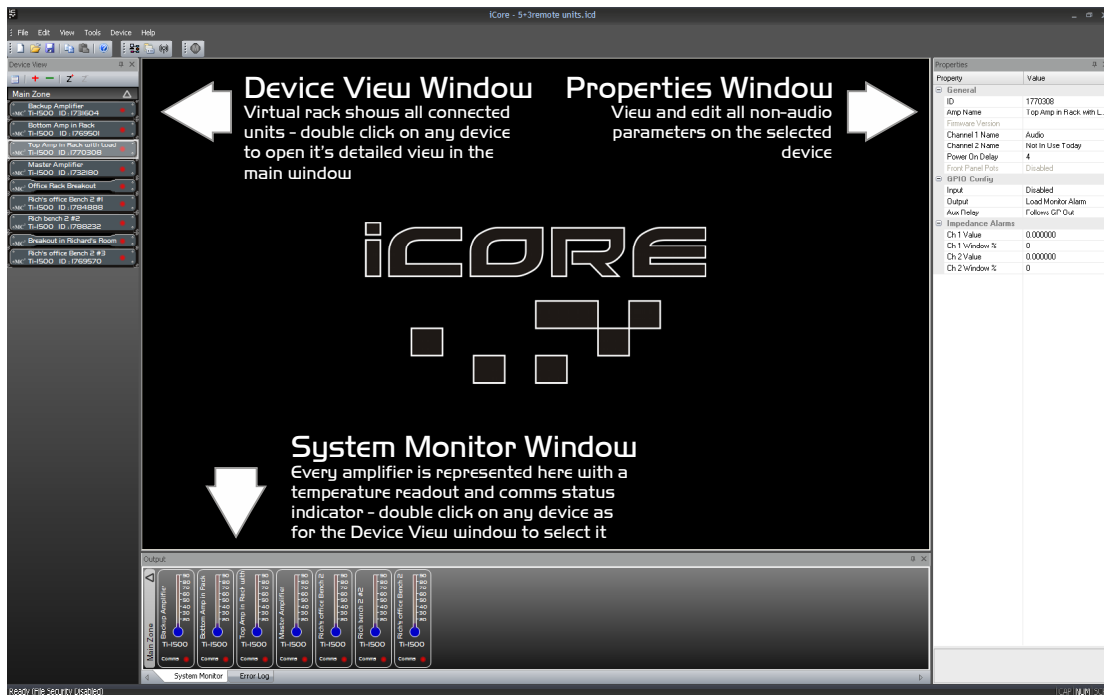


The baud rate must remain at 57600 to ensure compatibility with all connected devices.

The safest method of connection to avoid accidentally changing any device settings is to select "Retrieve settings from units" as this will upload all amplifier(s) properties and parameters to the computer.

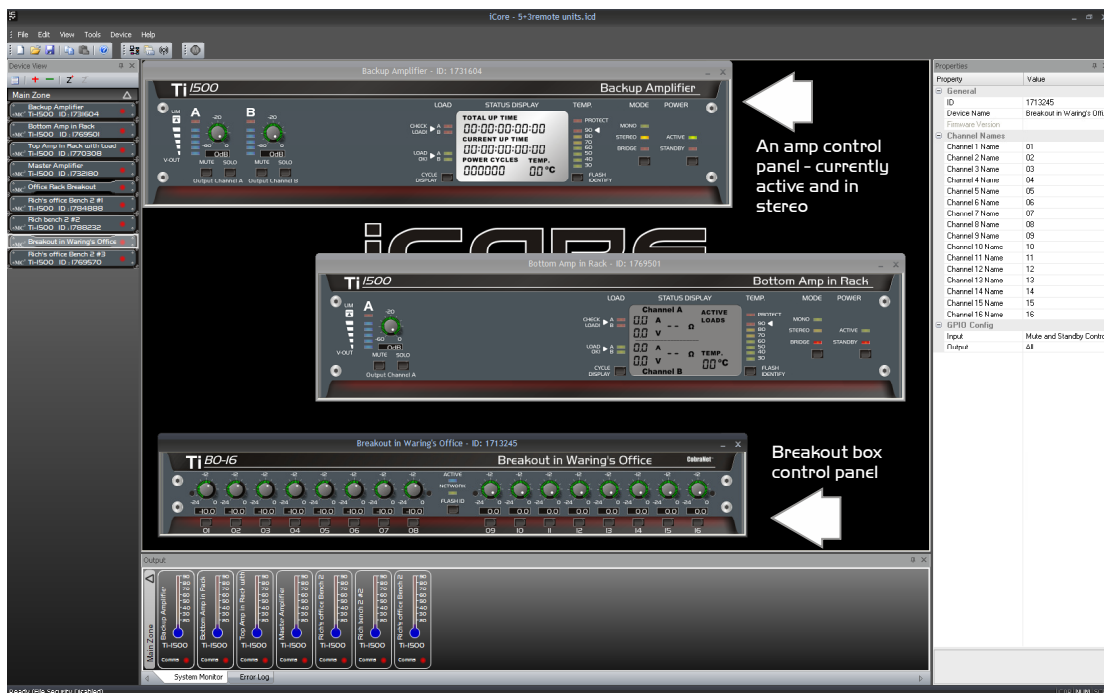
Having selected the COM port, this window may now be closed by clicking OK. We can now scan for connected devices and build up a list of all units on the network. Either select Tools ⇒ Autoscan, or press the button on the toolbar. As each device has a unique serial number IC built in, there is no need to worry about setting ID numbers. An intelligent algorithm is used in conjunction with all devices, so we don't need to check each number individually. (There are over 200 million possible IDs!)

None the less, the entire process will take approximately 90 seconds to complete. As the search continues, the device view should begin to fill up with connected units. When complete, depending on what's connected of course, there should now be a "rack" of devices like this:



Layout of the Main Window

A double click on any device will display its "front panel" for editing of audio properties. Non-audio properties are shown in the "Properties Window" on the right hand side of the main window.



In the example on the last page, all devices are off-line, as shown by the red indicator by each unit in the Device View and the System Monitor view. When connected and on-line, the indicators will be green. A yellow flashing indicator means there is a problem – hover over the device in question to see a tool tip explaining what is wrong.

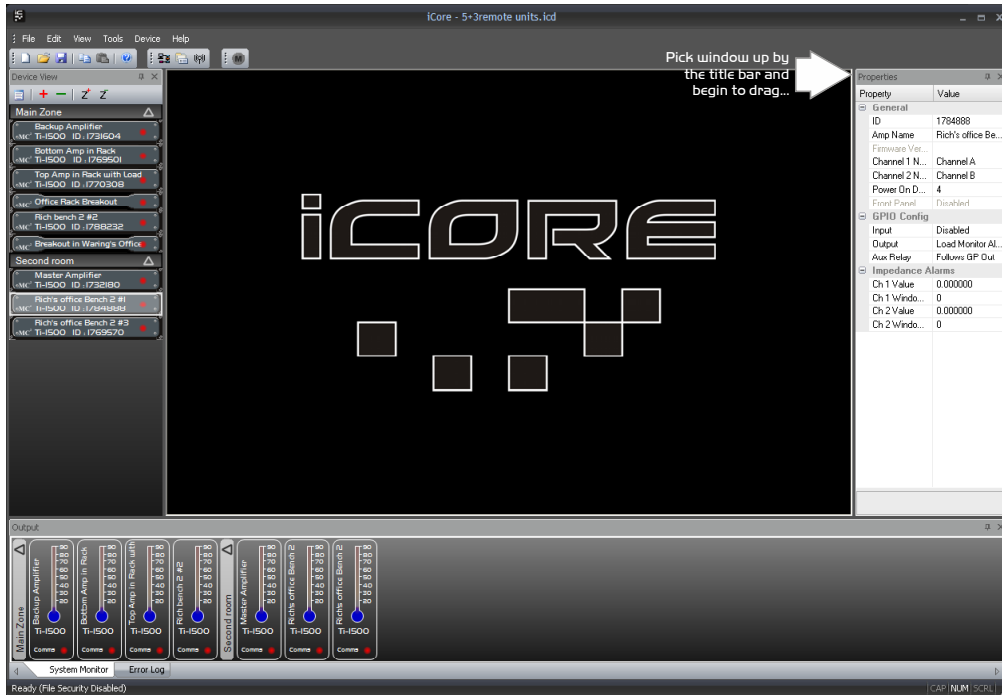
Before looking at the details of an amplifier's controls and properties, here are a few general pointers about using the software:

- ✓ The last saved file can automatically be opened when the software is started by setting the option in the Tools ⇒ Options ⇒ General tab.
- ✓ Settings can be copied between units either using the buttons on the toolbar (which uses the currently selected amplifier) or by using the right-click context menu on the unit's "front panel" or in the Device View.
- ✓ The Global Mute works from either the toolbar, menu, or by pressing 'Ctrl+M' on the keyboard.
- ✓ The error log is stored to a file called "Logfile.txt" which is stored in the same directory as the program executable file.

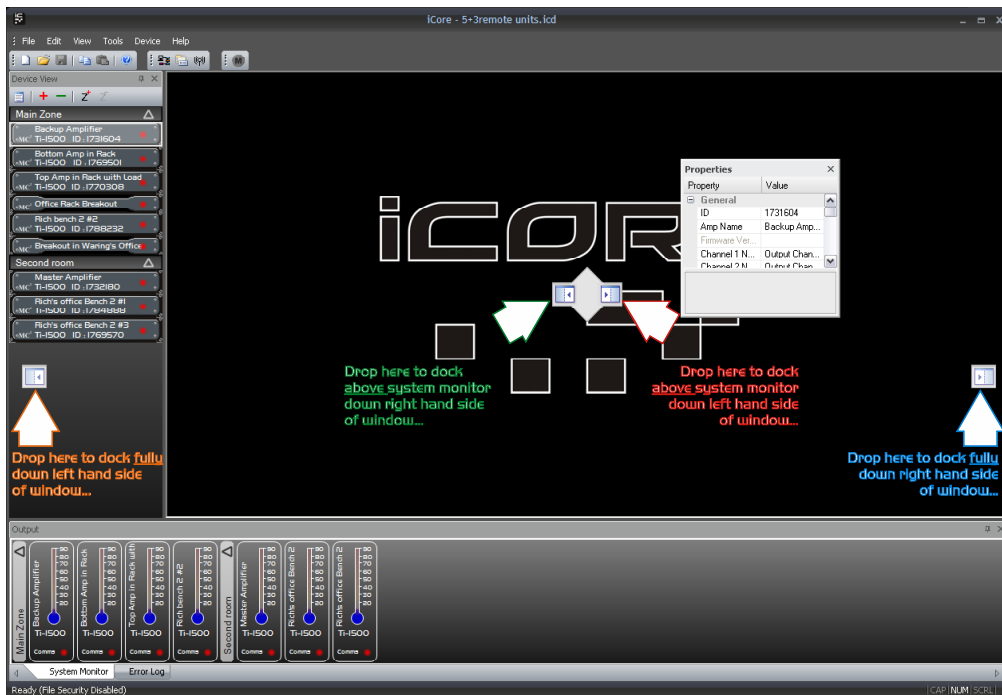
Remember to save your system before closing **iCORE** to avoid having to rescan the system every time you open the software. All window positions, zones, and screen layouts (so positions of the Device View, Properties and System Monitor) are also saved.

Reorganising the Main Window

To move inner windows about, pick them up by their title bar:



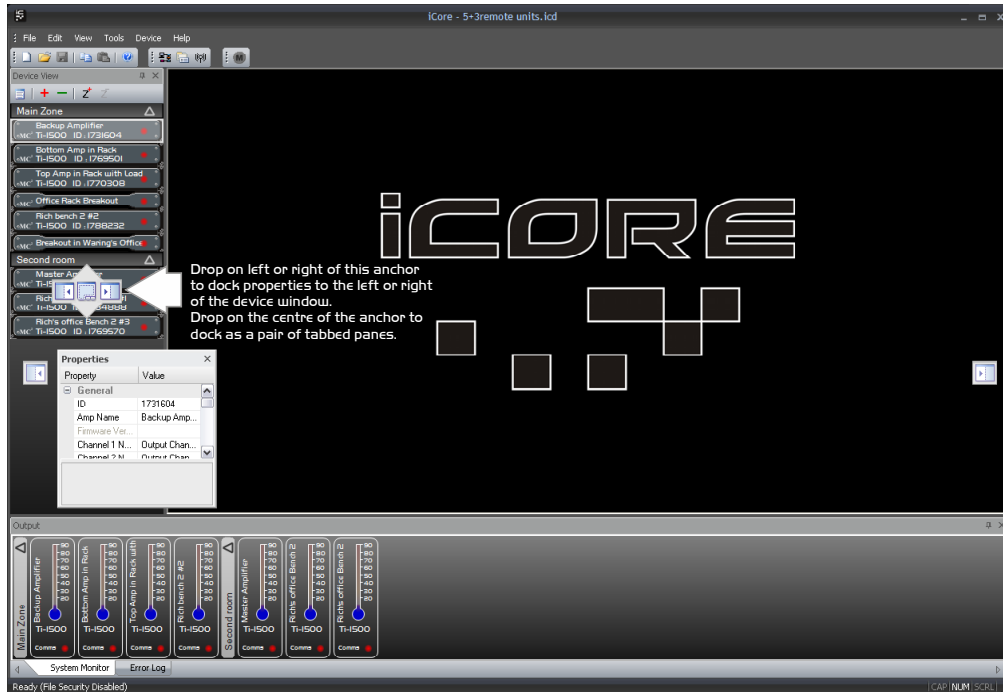
For example, to move the properties window and re-dock it, pick up the properties window by its title bar and begin to drag it. This will make a number of docking option anchors appear – these look like this:



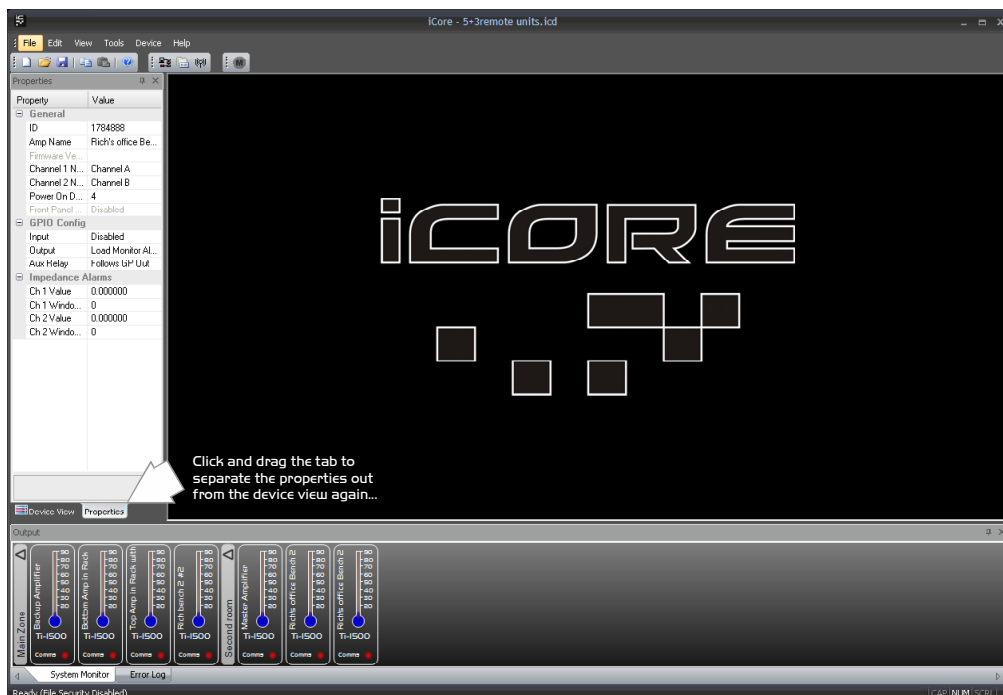
Drop the window on one of the anchors to dock it in the new position, as shown above. Similarly, the system monitor window can be docked either top or bottom

of the main window, and either fully across this window, or bracketed by the device view and/or properties window.

The device view and properties windows can be combined into a single tabbed window by picking either up and dragging it directly onto the other window where a new anchor will appear.



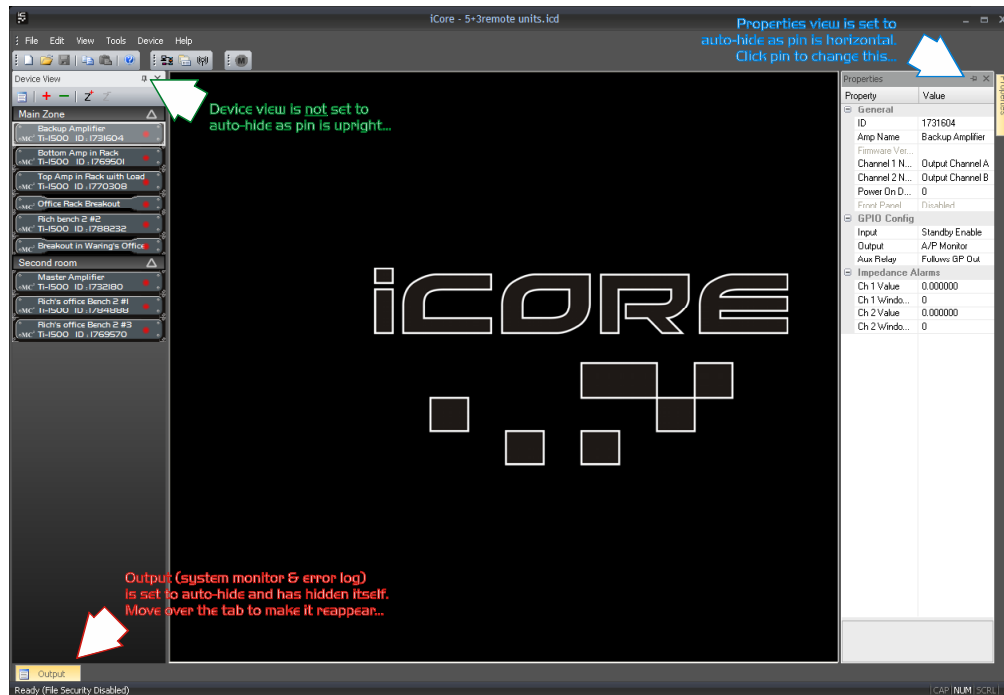
To separate out the windows again, just click on the tab of the window and drag and drop it as required to select a new position.



Windows can also be left floating by dragging them from their current positions and just dropping them on the main background.

Auto-hiding Windows

All inner windows can be set to “auto-hide”, so they disappear into the edge of the main window when not required to maximise available screen area, but make them quickly available if necessary.

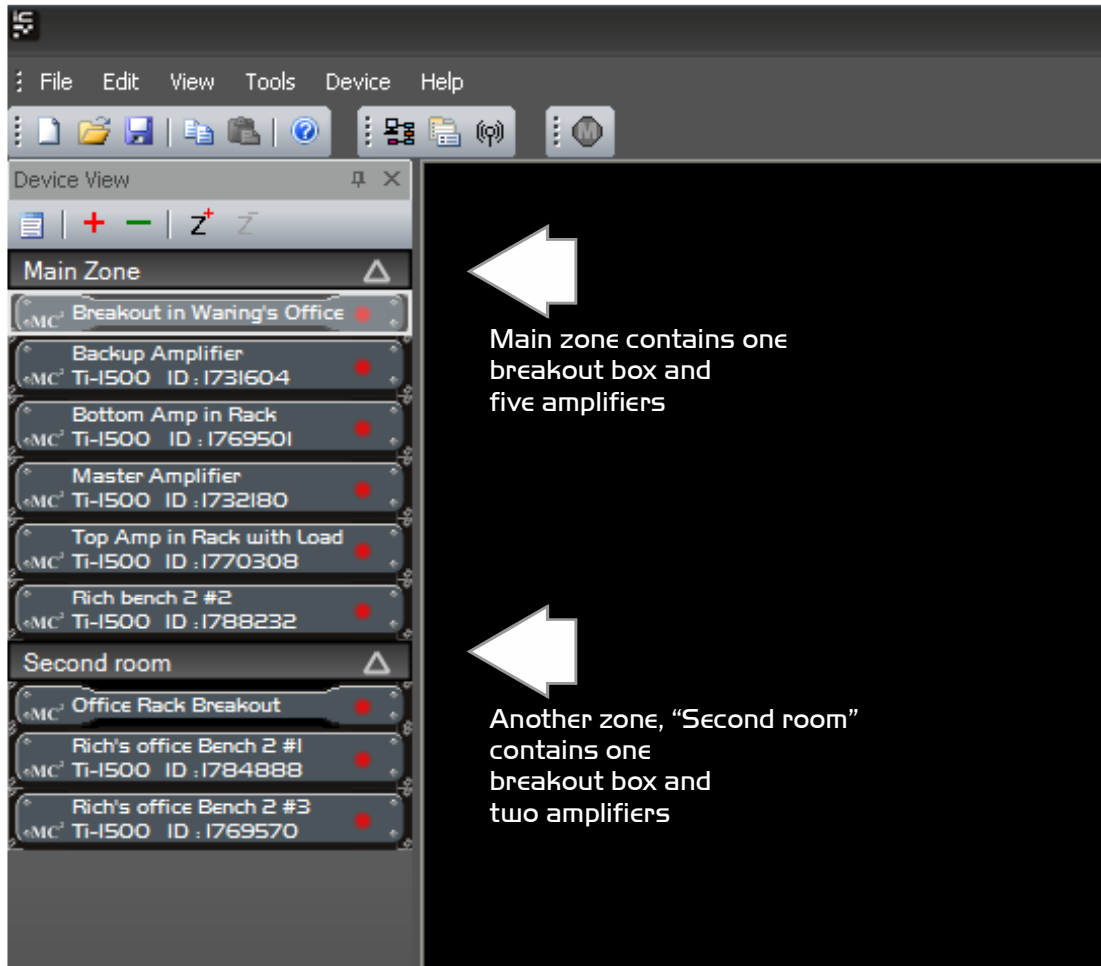


Remember, if any windows have been closed they can be reinstated through the menu View ⇒ Toolbars and Docking Windows.

Zoning Devices

The zones shown in the Device View and System Monitor windows allows groups of devices to be logically arranged to reflect their physical locations more accurately than just one large list of units.

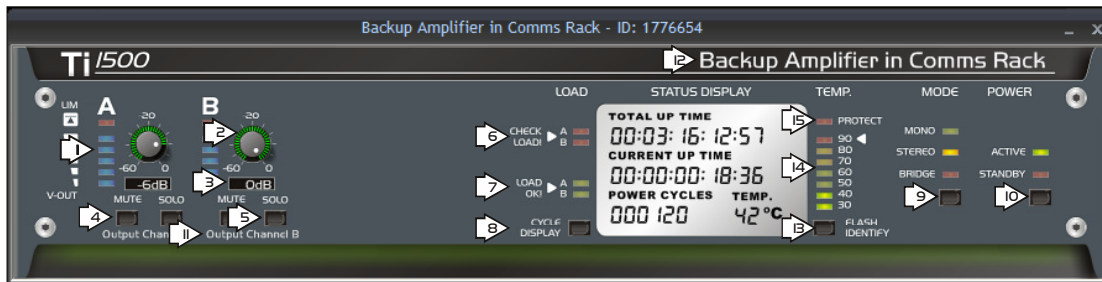
The example below has different amplifiers (and breakout boxes) split into two zones, and the units reordered to make it easier to locate them on screen.



Things to know about zones:

- ✓ There's always a master (main) zone, which you can never get rid of.
- ✓ New zones can be added using the Z⁺ button at the top of the rack view.
- ✓ Devices can be moved into new zones just by clicking on them and dragging them to the required zone. They can also be reordered within a zone like this.
- ✓ Zones can be renamed by double clicking on their names.
- ✓ Zone can be expanded and collapsed using the Δ in the zone header.
- ✓ Files will remember the zone layouts including expand/collapse status when you save them.

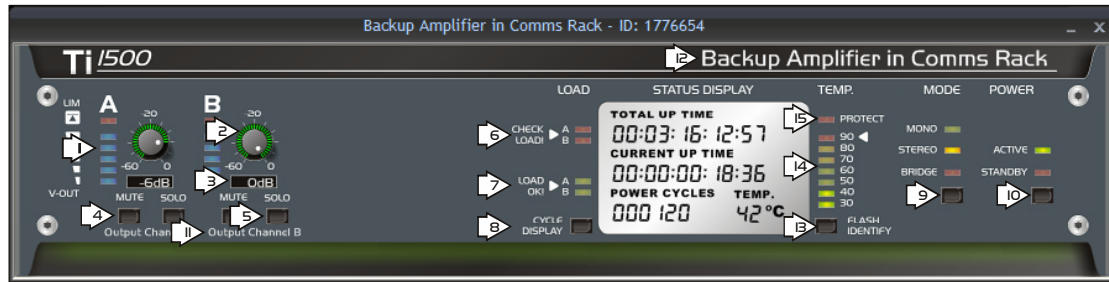
Amplifier “Front Panel” Controls, Readouts and Indicators



Double click an amplifier in the system monitor or device window to show the front panel. When on-line, the bottom “vent” glows green. If the amplifier is off-line, perhaps due to a comms issue then this glow will change to red.

The controls, indicators and displays are:

- 1) Channel output voltage indicator: This gives an averaged indication of signal present and is deliberately not calibrated, as it will show full scale at relatively low levels of signal. The red limit indicator, however, will illuminate when the amplifier channel’s (fixed) limiter threshold is reached.
- 2) Output level control: Clicking on this and dragging *vertically* will adjust the gain of the channel. Note that this is independent of the physical front panel controls. If you need this to be calibrated and offer guaranteed adjustment of the channel’s gain, make sure the front panel control for that channel is set to maximum (0dB). Please see the section on page 51 about disabling the front panel gain controls if you want just these software ones to work.
- 3) Output level text readout and entry: It is also possible to directly enter a gain value by double clicking on the text readout. Press ENTER to accept the new value. Note that due to the non-linear nature of the digital potentiometer, the software will jump to the closest value if a value is entered that cannot be executed, for example, -52dB will become -51dB.
- 4) Output mute control: Cleverly, pressing this button will mute the selected channel’s output. Remember that this is stored in the amplifier on power down, so unless you deliberately intend to keep a channel muted permanently, don’t leave a mute on and then close **iCORE!**
- 5) Output solo: **USE WITH CAUTION! PRESSING A SOLO WILL MUTE EVERY OTHER AMPLIFIER OUTPUT ON THE SYSTEM!** This is very useful during system set-up, or to try and isolate a problem speaker. However, as with the mutes, remember that this state will be held in each amplifier after the software is closed so don’t exit **iCORE** with a solo enabled!
- 6) “Check Load” indicators: If the amplifier channel has been programmed to monitor a load value, then if this goes out of range, the indicator will illuminate. If the load is in range then the corresponding “Load OK” indicator will illuminate. If the load cannot be verified, then both the Check and OK indicators will be off. See page 45 for more information.
- 7) “Load OK” indicators: Indication of a load operating within its programmed range. See page 47 for more information on how to program load values and set the validity range.



8) "Cycle Display" button: Pressing this will change the Status Display to show connected load readings, along with averaged output voltage and current readings. This can also be actioned with a double click on the actual Status Display screen.

9) "Mode" button: Press this to cycle through the three amplifier modes. Note that in "Bridge" and "Mono" mode, the controls and indicators for channel "B" will disappear as only channel A is used as a signal feed in these modes.

10) "Power" button: Press this to swap the amplifier between Active and Standby modes. All controls will be briefly disabled when swapping modes. In Standby, the amplifier is still online and on the network, but all monitor data is disabled. The Status Display of "Total Up Time" is also stopped when in standby, and the Status Display Screen dimmed to reflect this.

11) Output channel names: These names can be changed by either double clicking them on the panel, or through the Properties window. 16 chars max.

12) Amplifier name: This can be changed by either double clicking it on the panel, or through the Properties window. 40 chars max.

13) "Flash Identify" button: Pressing this will flash the Power LED in yellow on the physical front panel (and the Mono & Stereo LEDs on the rear panel) for five seconds to allow easy identification of each amp on the network. This function also works in reverse from the amplifier – if the "Identify" button is pressed on an amplifier, it will flash the LEDs on its front panel, as well as flashing the text of the relevant amp panel in the Device View for five seconds.

14) Temperature readout: This gives an "at a glance" display of the current operating temperature of the amplifier. The more accurate readout is also enumerated on the status display.

15) "Protect" indicator: This will illuminate if the amplifier goes into protect for any reason. The status display information will also turn red. Conditions that can cause the amplifier to protect itself are described on page 15.

Additional Amplifier Properties

All other amplifier properties that are not directly related to audio and real time control are listed in the Properties window. These are:

General: *ID*: This is the amplifier's unique serial number (Read only)
 Amp Name: Click to edit the name of the amplifier
 Firmware version: Currently running amp firmware (Read only)
 Channel names: Click to edit channel names
 Power on Delay: Enter a time from 0 to 60 seconds to adjust the time between standby and on. See the section on page 14 for more information.
 Front Panel Pots: Enabled/Disabled (Read only) Please see page 49 for how to adjust this internally in the amplifier.
 Alarm Temp. Threshold: Set threshold to trigger alarm output

GPIO Config: *Input*: Choose how the general purpose input line behaves.

 Mute Enable – See page 38
 Standby Enable – See page 43
 VCA Mode – See page 42
 Delay Disable – Bypass Power on Delay
 Trim Bypass – Set Digital Pots to 0dB

Output: Choose how the general purpose output line behaves.

 A/P Monitor: Triggered by amp going into protect
 Temp. Alarm: Triggered if temperature > threshold
 Limiters Monitor: Triggered if either channel in continuous limit for > 15 minutes
 Load Monitor Alarm: Triggered if a programmed load reference goes out of range - See page 45

Aux Relay: Enable or disable the relay following the G.P. Out line.

Impedance Alarms: *Ch1 Value*: Value updated automatically – see page 45

Ch1 Window %: Set maximum deviation from value

Ch2 Value: Value updated automatically – see page 45

Ch2 Window %: Set maximum deviation from value

Ch3 Value: Value updated automatically – see page 45

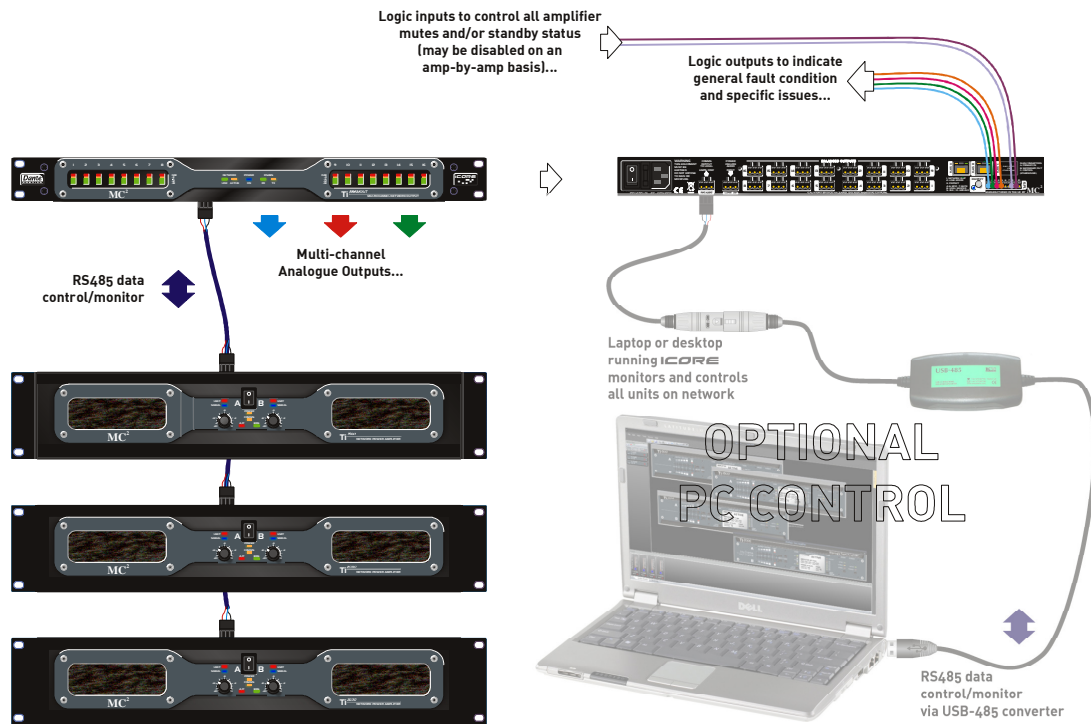
Ch3 Window %: Set maximum deviation from value

Ch4 Value: Value updated automatically – see page 45

Ch4 Window %: Set maximum deviation from value
(Ti-4250 only)

Remote Monitoring Off-line with a Breakout Box

By using a **Ti Series** Breakout box, the system can be monitored for any fault conditions using the same connections as for full on-line remote monitoring, but with the advantage that a PC doesn't have to remain on and running **iCORE** at all times. **iCORE** is used to scan the network once only and locate all devices (amplifiers and all Breakout boxes). This list of network addresses and unit types is sent automatically to every Breakout box on the network. They all store this information permanently so that any one of them can become a "Network Master".



The computer can now be disconnected or powered down. Whichever breakout has been designated as the "Network Master" will then interrogate every other connected device and check for any faults. It can then report any fault conditions via a built-in set of general-purpose output lines. These give feedback of the following:

- 1) General fault indication: This can be programmed to assert for any combination of the possible system fault conditions. It is permanently asserted under the chosen fault conditions (the three below).
- 2) Load error: This will be asserted if any amplifier channel which has load monitoring enabled has a load that has gone out of range.
- 3) Network error: This will be asserted if any amplifier or breakout stops responding to interrogation for more than four seconds.
- 4) Protect error: This will be asserted if any amplifier goes into protect.

There are G.P. input lines available on the breakout boxes as well, which can be used to send global network commands to all amplifiers, putting them into standby or muting them.

For more information on connecting Breakout boxes and configuring the GPIO, please see its operator's manual.



The General Purpose Interface – Utilisation

Overview

The general purpose input output port has many uses including the following operating options, all programmable via **iCORE**:

A general purpose input which may be programmed to:

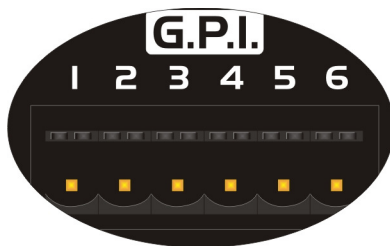
- ✓ Control the amplifier's standby/active state (logic level)
- ✓ Mute both channels (logic level)
- ✓ Bypass the power on delay (logic level)
- ✓ Variable VCA level control of both channels (analogue voltage)
- ✓ Bypass the VCA sections (logic level)

A general purpose output which may be programmed to:

- ✓ Indicate A/P state
- ✓ Indicate excessive limiting on either channel (15 minutes continuous)
- ✓ Indicate a load range error
- ✓ Indicate your birthday
- ✓ Indicate an excessively high temperature state (before shutdown)
- ✓ Logical combinations of the above

An isolated changeover relay is also brought out to this port. This may be programmed to:

- ✓ Follow the GPO output state
- ✓ Follow the opposite of the GPO output state (invert its logic)



The connections on this port also include a 3V3 output for use with all logic or analogue level inputs. For ground (0V) connections, this must be derived from the RS485 "Phoenix" connector.

The pin-out of this port is:-

- Pin1: Isolated relay normally open contact (ON state)
- Pin2: Isolated relay common contact
- Pin3: Isolated relay normally closed contact (OFF state)
- Pin4: 3V3 Output
- Pin5: GP Input (maximum input voltage 12V, useable range 0V – 3V3)
- Pin6: GP Output (OFF state = 0V, ON State = 3V3)

Example uses of the GPIO port lines

Given the flexibility of the GPIO lines on the **Ti Series** of amplifiers, there will undoubtedly be many uses beyond what we intend, but just to help, here are some examples of how we envisage the port to be used.

Connection to building management systems to report amplifier errors

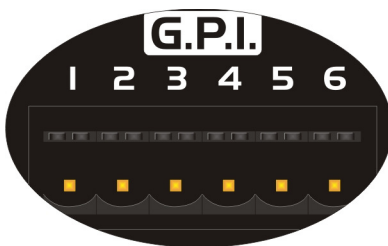
As explained earlier, the general purpose output line and its associated relay, may be configured through **iCORE** to trigger on a variety of error conditions. In this example, we will configure the line to trigger if the amplifier goes into protect.

In **iCORE**, select the amplifier and open its properties window (View ⇒ Device Properties)



Set the GPIO Config "Output" property to "A/P Monitor", and the "Aux Relay" property to "Follows GP Out".

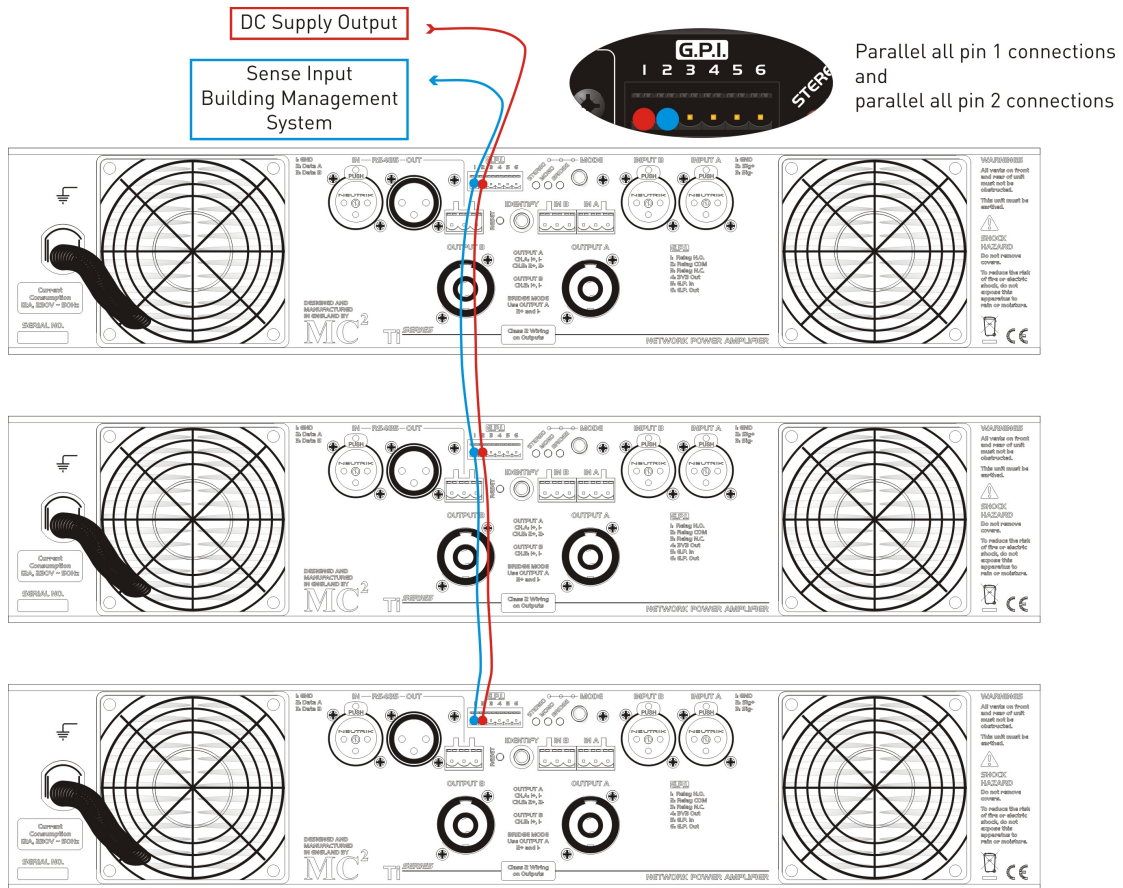
This ensures that, should the amplifier go into "Protect" for any reason, it will send the output pin on the GPI port high, and also flip the state of the relay.



If the building control system will recognise a 3V3 signal, then just connect its "sense" input to pin 1 of the GPI port.

If the system requires a higher voltage (12V and 24V are common) then connect an appropriate supply to the common relay pin (pin 2) and the "sense" input to the normally open relay contact (pin 1).

If multiple amplifiers are required to all be connected to the same "sense" line, then the relay output **must** be used. In this case, connect the appropriate "trigger" voltage to the common relay contact and parallel up the normally open contacts, as shown overleaf:



Note that changing the property of the “Output” GPIO Config will make the amplifier trigger it’s output line (and relay, if enabled) in response to different conditions, such as excessive limiting, or measured load errors.

Please see the section on page 45 for how to configure the amplifier to monitor its connected loads.

Automatic muting of single or multiple amplifiers

The GPI input line can be configured to automatically mute the amplifier, or multiple amplifiers, in the event of a fire alarm system needing to take precedence for voice evacuation purposes. Note that local muting takes precedence over remote muting though **iCORE**.

In **iCORE**, select the amplifier and open its properties window (View ⇒ Device Properties)

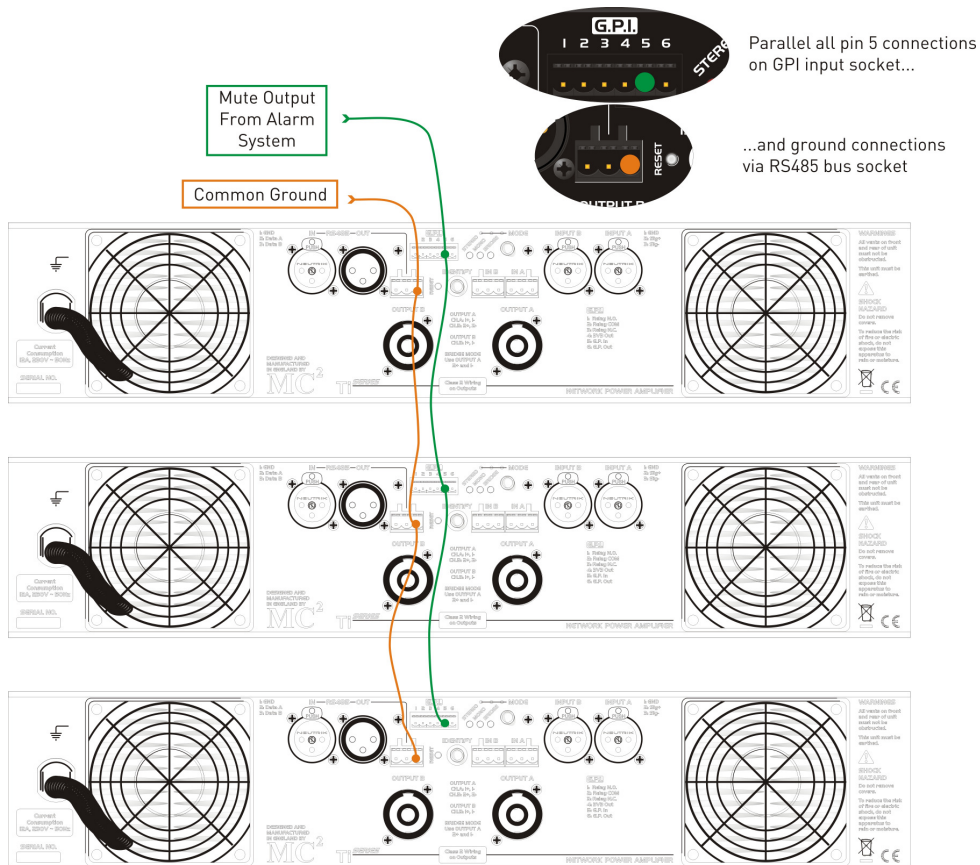


Set the GPIO Config "Input" property to "Mute Enable".

A 3v3 signal on the GPI input line would now force both channels of the amplifier to mute. Grounding this input will unmute the amplifier channels.

As this is being used as input control system,

all amplifiers that are to be controlled can simply be connected in parallel to the control signal, as shown below:



VCA control of amplifier levels

Each amplifier is equipped with a digital potentiometer which can be controlled either remotely using **iCORE**, or locally via the GPIO port. Note that the local control will take precedence over any remote settings so it's advisable not to enable local control at the same time as trying to make remote adjustments. Both channels are adjusted together under local control and no relative offset is possible.

In **iCORE**, select the amplifier and open its properties window (View ⇒ Device Properties)

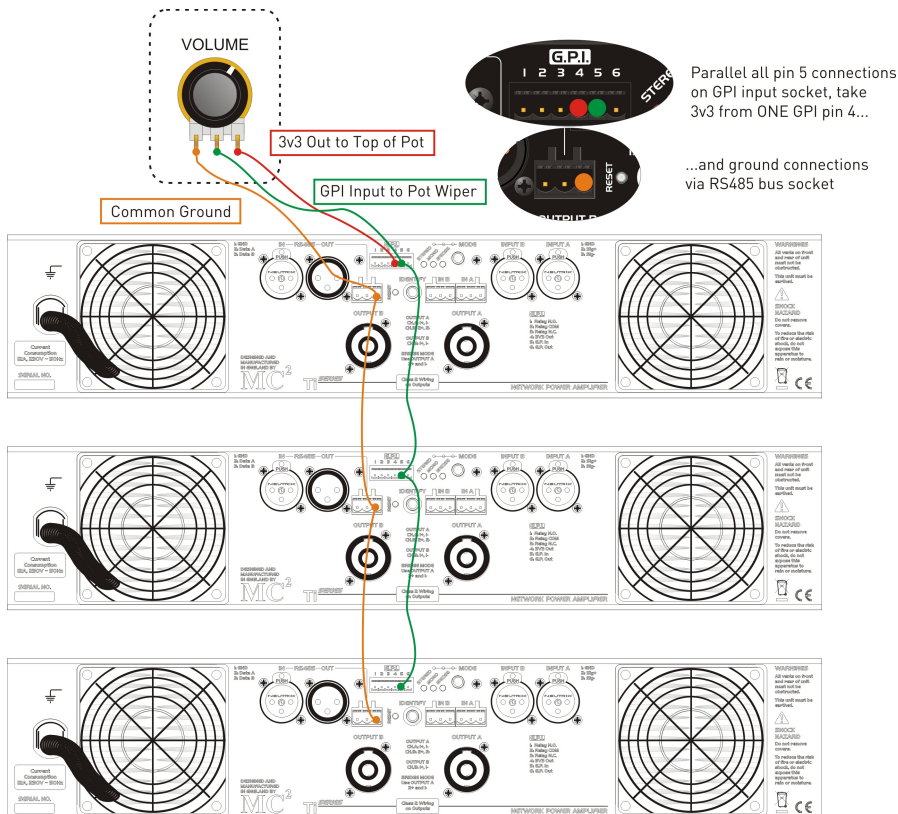


Set the GPIO Config "Input" property to "VCA Mode".

An analogue control voltage from 0v to 3v3 on the GPI input line will now adjust the gain of both amplifier channels, with 3v3 being 0dB.

Grounding this input will effectively mute both channels.*

As this is being used as input control system, all amplifiers that are to be controlled in this manner may have their control inputs wired in parallel to the control voltage – as shown below using a basic "Remote" potentiometer.



If required, the front panel pots can be disabled – this setting can be monitored through **iCORE**, but not adjusted. Please see the section on page 49 for how to disable these controls.

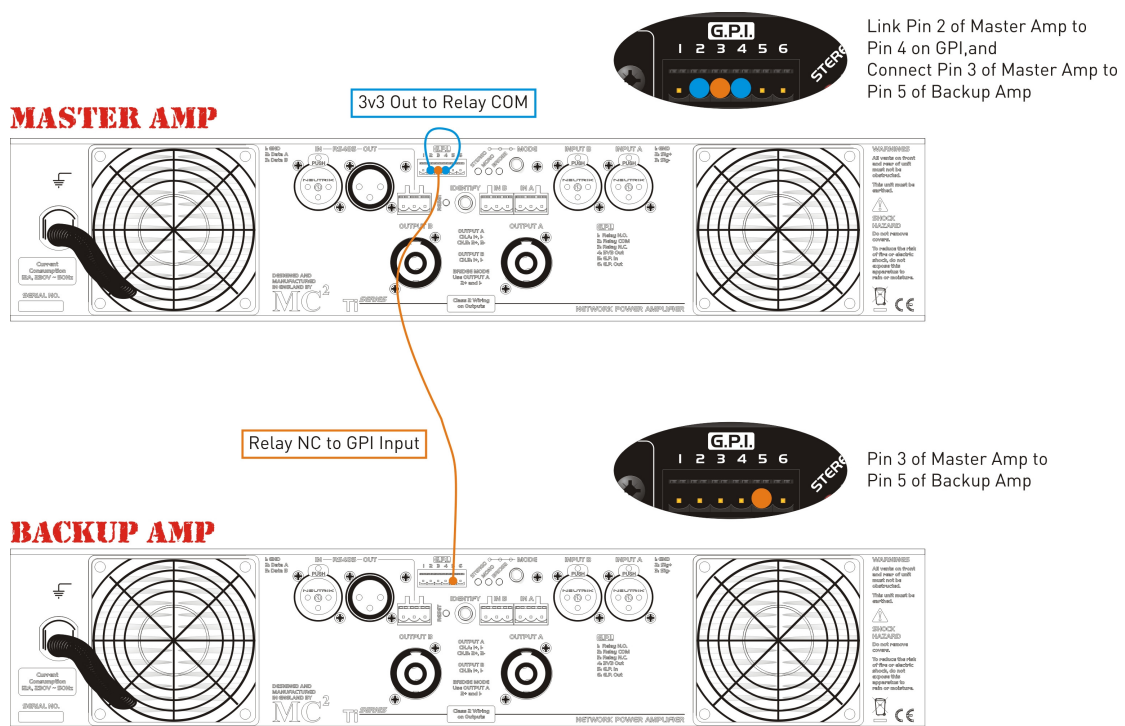
*Muting is specified as -90dB gain reduction relative to 0dB and this is only possible using the mute facility – the amount of gain reduction possible using the digital VCA control is -60dB .

Master and backup amplifier configuration with automatic switchover

In safety critical applications, it may sometimes be necessary to ensure that the audio signal is not interrupted by the possibility of amplifier failure. The most important amplifier channels may be “backed up” using a slave amplifier, normally held in standby. This will automatically take over from the main amplifier if there is a power failure to the main device, or it goes into “Protect” for any reason.

This scenario can be easily achieved with a simple connection between the two amplifiers and a few configuration changes through **iCORE**.

It is clearer to explain how this will work by considering the physical configuration first of all, then the settings required through **iCORE**.



To monitor the state of the master amplifier effectively, we must not only watch the GPO line for the protect signal, but also know when the amplifier has lost power for any reason. This is achieved by not directly using the GPO line for the protect signal, but using the 3v3 line through the relay’s normally closed connection.

The slave amplifier is set to “Standby Enable” via the GPI line. In this way, a 3v3 signal on its GPI line will hold it in standby. Under normal operating conditions, the 3v3 signal will be supplied by the master amplifier though the NC relay contact. Should the master amplifier go into “Protect”, it will flip the relay contact and so bring the slave amp out of standby to take over. Similarly, should it lose power for any reason, then the 3v3 supply will collapse, also causing the slave amplifier to take over.

In **iCORE**, select the **MASTER** amplifier and open its properties window (View ⇨ Device Properties)



Set the GPIO Config “Output” property to “A/P Monitor”.

Next select the **BACKUP** amplifier and open its properties window.

Set the GPIO Config “Input” property to “Standby Enable”.

We would recommend you also set the “Power On Delay”

property of the **BACKUP** amplifier to 0 to minimise the break in audio, should there be a switchover. Note that if the master amplifier’s fault condition is rectified, then it will take over again and the slave will automatically be put into standby.

Remember you will need to connect the link output(s) to the slave amplifier and also the speaker(s) to both units!

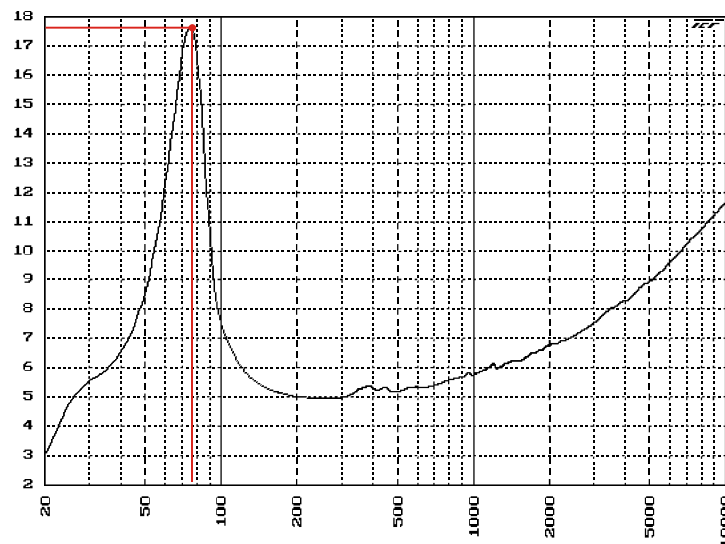
Load Monitoring – What For and How

Overview

All the **Ti Series** amplifiers incorporate sophisticated load monitoring facilities that may be used for general feedback of the connected load conditions, or programmed to provide simple go/no-go status.

The system has been optimised to work with steady state stimuli – that is either a continuous tone, or pink noise.

The real time monitoring of load impedances using program material (either voice or music) is inadvisable due to the great variability of driver impedance with frequency.



The impedance plot shown here is that of a typical low frequency driver with a specified *nominal* impedance of 8 ohms.

At the driver's main resonant frequency, shown by the red line, the impedance rises to over 17.5 ohms, whilst the minimum impedance is 4.95 ohms.

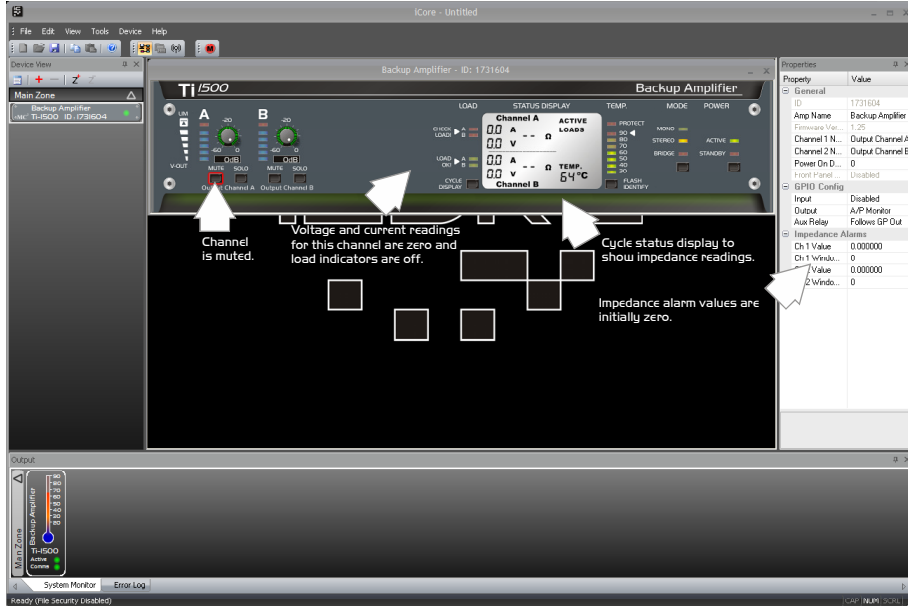
Rather than specify nominal impedance for a driver for the amplifier to compare against, the amplifier continuously measures the connected load and the user specifies the value when happy with the value. In this way, when a specific test tone is used, the actual impedance of the driver can be captured at this frequency without needing to know the impedance response of the speaker.

The system is designed to work with output levels in the region of 1V and 100mA, equating to an output power of approximately 100mW. This value has been chosen to facilitate both continuous monitoring (traditionally using a very high frequency low level tone > 17kHz) or sequenced burst testing using spot frequencies (chosen depending on the driver/system connected) or pink noise.

Also note that, in order to stabilise the impedance readings sufficiently, there will be approximately 5 seconds of delay between load changes showing up in the software and these changes triggering a load error.

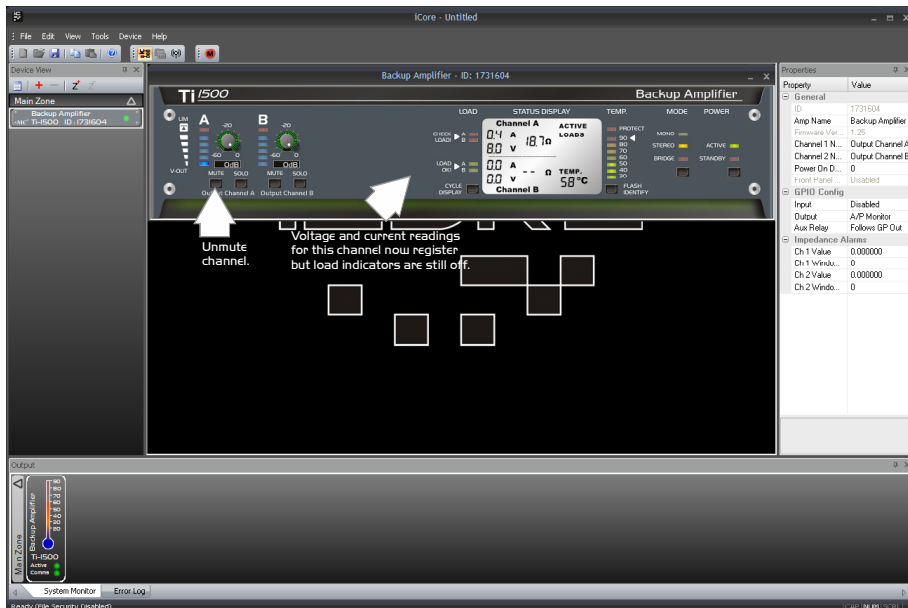
“Learning” the Connected Impedance

Whilst the amplifier is always measuring the impedance of the connected (or disconnected!) load, it is necessary to interface with a PC and use **iCORE** to set the impedance reference and the allowable deviation from this value. Assuming the amplifier is connected to its load and also to the PC, in **iCORE** bring up the amplifier’s “Front Panel”.

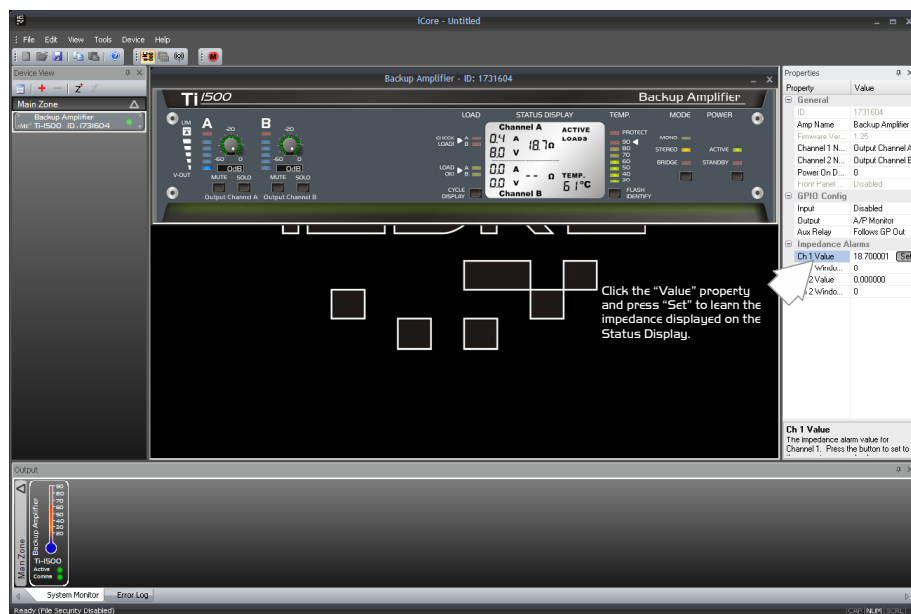


Ensure the channel is muted initially and the front panel gain pot is set to minimum. Make sure you can see the voltage/current/impedance display by pressing “Cycle Display” or double clicking on the Status Display area.

With an appropriate test signal fed into the correct channel, and a load connected, unmute the channel and slowly turn up the front panel pot. The voltage and current readings should begin to register and, after a few seconds, an impedance reading will be displayed.



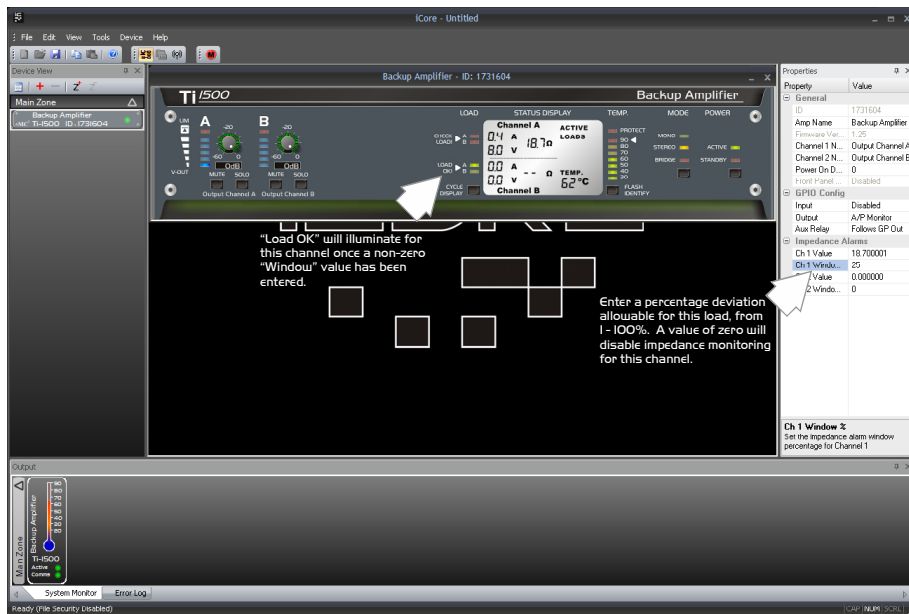
Once the impedance reading has registered, click in the Properties window by the Impedance Alarm Value for this channel. A "Set" button will appear. Pressing this will capture the impedance displayed on the main panel, and the amplifier will learn this as its valid load reference. You can press this as often as you want to capture the value required.



The last step in this procedure is to enter a percentage deviation value allowable from this reference. Note the following points when considering the deviation value.

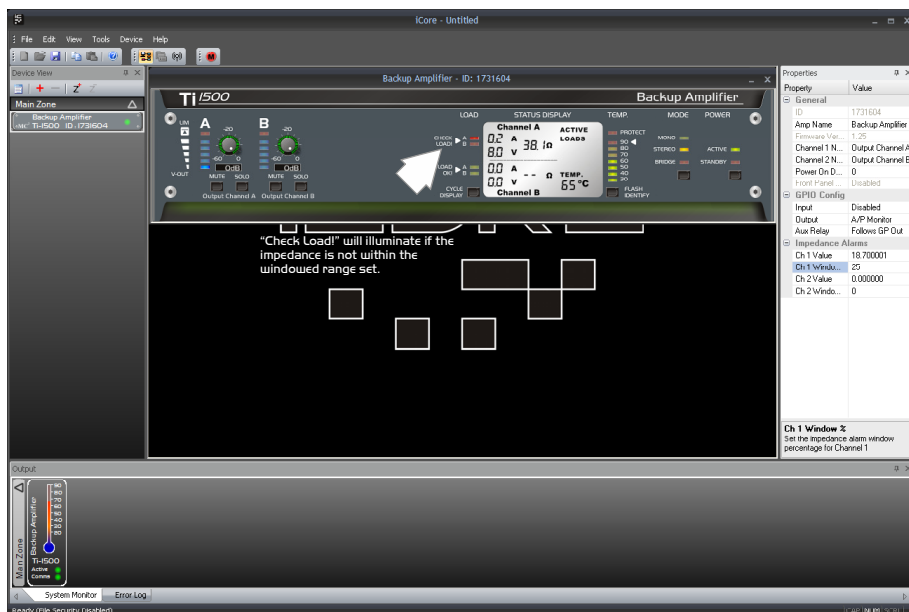
- 1) The allowable range is 0 – 100%. This means that if the reference is, for example 8 ohms and the deviation is 25%, the load will be flagged as OK as long as it stays with the range of 8 ohms, $\pm 25\%$, so 6 – 10 ohms.
- 2) It is recommended that load monitoring is performed using a steady state stimulus – so a sine test tone or pink noise. For the reasons outlined in the overview section, attempting to measure impedance accurately with a music signal will result in erratic performance.
- 3) For non-continuous monitoring with test tones or pink noise, if these are performed in the absence of any normal program material (music or voice announcements) the deviation can be set to a relatively low number (30 – 40%) as the test conditions can be accurately repeated.
- 4) For continuous monitoring, with HF (>17k) tones at low levels, if the system checks cannot be performed in the absence of program material, set the deviation to a much higher value (60 – 80%). This will allow for program material to affect the measured impedance without causing warnings to be triggered.
- 5) To DISABLE impedance measurements for any channel, once a value has been set, just enter a value of 0 for the window value.

To summarise, if there is going to be program material present then use a wide window value. A smaller value can be used for testing if this can be performed under guaranteed conditions – no program material – and a set frequency stimulus signal.



So, entering the desired window value and pressing ENTER will cause the “Load OK” LED to illuminate for this channel. As the load monitoring is optimised to work at low levels, the system will stop taking readings when the operating level is too high – this is shown by the “Load OK” LED extinguishing for that channel, showing that the readings cannot be taken.


If the load readings are valid, and the load deviates outside of the set window for more than a few seconds, then the “Check Load” LED will illuminate, and the unit’s status LED will turn yellow and begin to flash in the Device View.



Appendix I – Internal Adjustments

Disabling the Front Panel Gain Controls (Dual Channel Amps)

For added security the front panel potentiometers can be disabled, preventing unwanted tampering with gain settings of any amplifier. This is achieved by setting links on the input board internally.

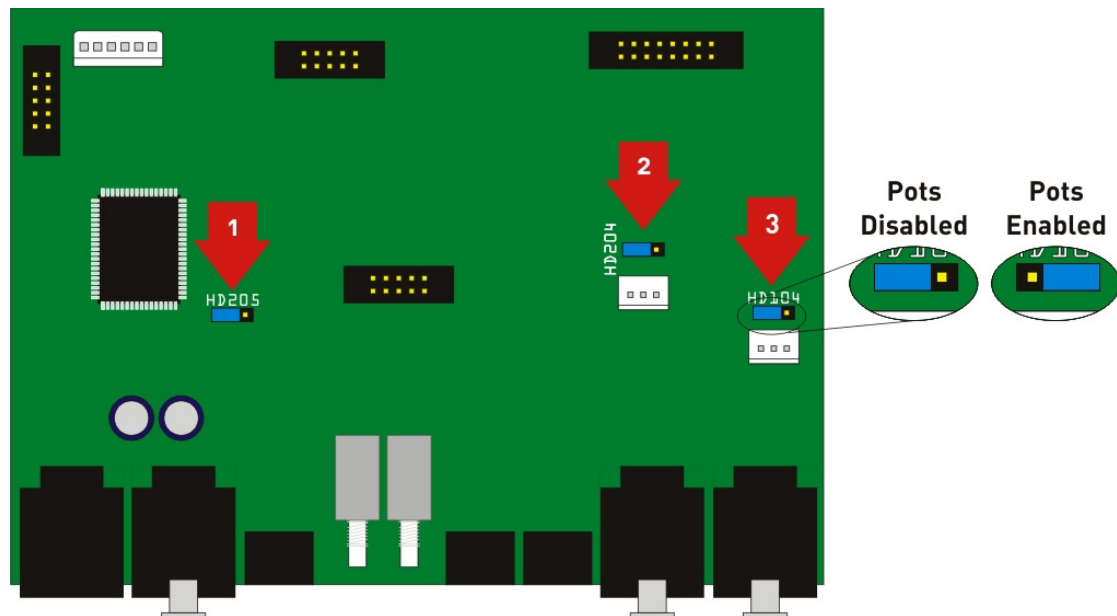


SAFETY WARNING

Removing the lid will expose you to potentially dangerous voltages! Disconnect the amplifier from the mains supply and do not touch any heatsinks as they may still be at a high potential!

After removing the lid and with the rear panel facing you, locate the input circuit board as shown below – it is attached to the input and RS485 XLR connectors. Find the three sets of links as marked by the arrows, and move them as shown to either disable or enable the pots as required.

Make sure all three are set to the same position!



HD104 disables the pot for channel A, HD204 disables the pot for channel B, and HD205 sets the pot enabled/disabled flag, the state of which can be monitored remotely through **iCORE**.

Once disabled, the pot gain is set to 0dB – this is wired in series with the digital potentiometer, which may still be used to adjust the gains remotely. Remember that if disabling the pots has not set the gain to the value you expect, the level may have been turned down remotely – check through **iCORE** and adjust if necessary.

Disabling the Front Panel Gain Controls (Ti-4250)

For added security the front panel potentiometers can be disabled, preventing unwanted tampering with gain settings of any amplifier. This is achieved by setting links on the input board internally.

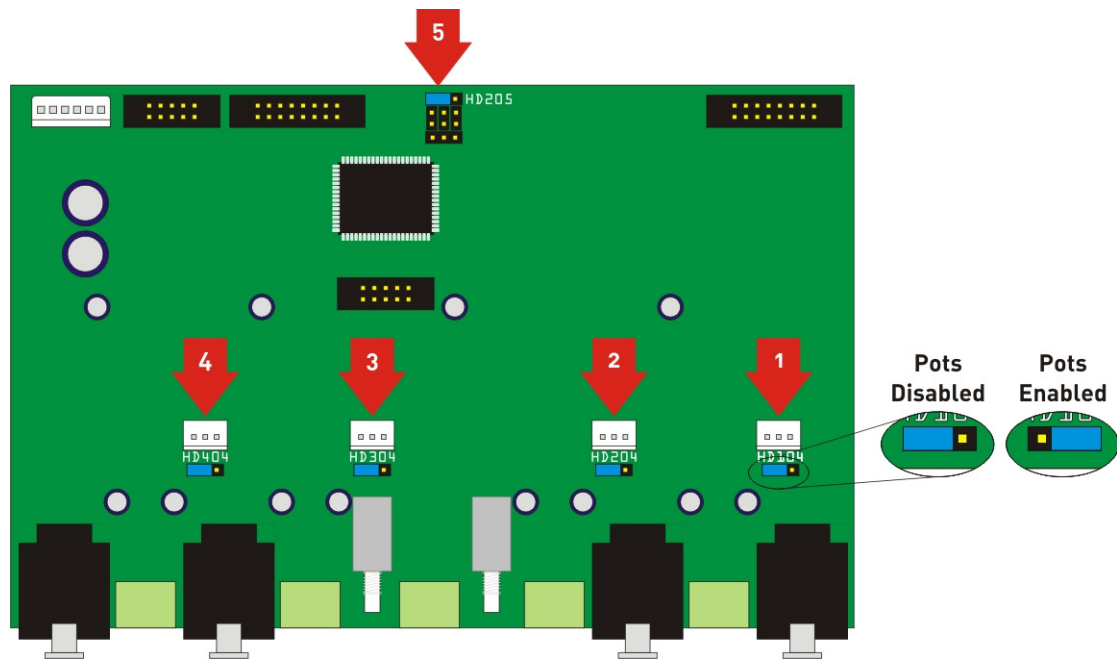


SAFETY WARNING

Removing the lid will expose you to potentially dangerous voltages!
Disconnect the amplifier from the mains supply and do not touch any
heatsinks as they may still be at a high potential!

After removing the lid and with the rear panel facing you, locate the input circuit board as shown below – it is attached to the input and RS485 XLR connectors. Find the five sets of links as marked by the arrows, and move them as shown to either disable or enable the pots as required.

Make sure all five are set to the same position!



HD104 disables the pot for channel A, HD204 disables the pot for channel B, and so on with HD205 setting the pot enabled/disabled flag, the state of which can be monitored remotely through **iCORE**.

Once disabled, the pot gain is set to 0dB – this is wired in series with the digital potentiometer, which may still be used to adjust the gains remotely. Remember that if disabling the pots has not set the gain to the value you expect, the level may have been turned down remotely – check through **iCORE** and adjust if necessary.

Adjusting the Amplifier's Absolute Gain (Dual Channel Amps)

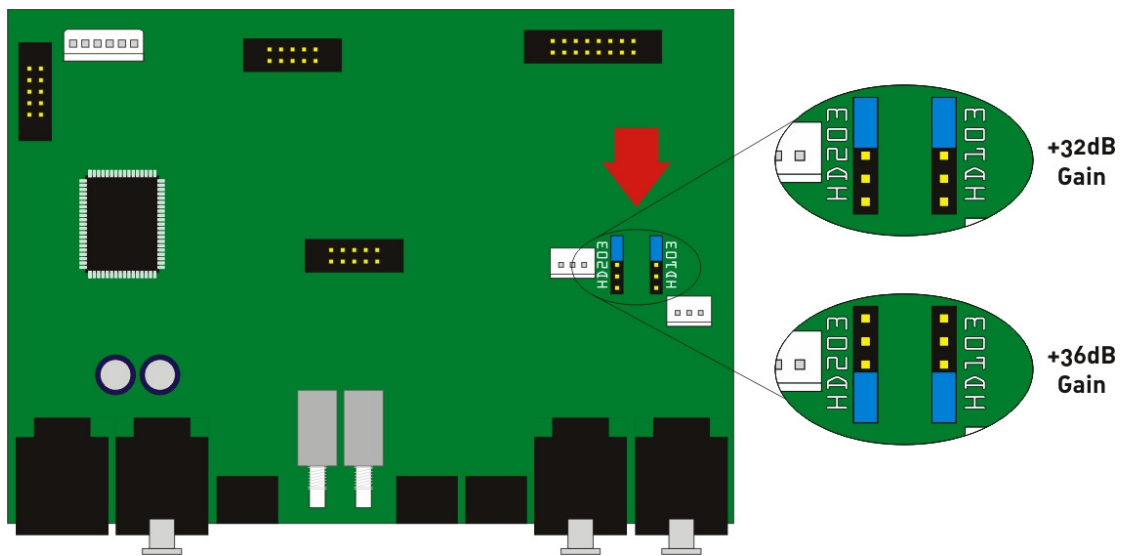
The voltage gain of the amplifier can be selected to be either +32dB (standard) or +36dB to match system sensitivity as required. This is achieved by setting links on the input board internally.



SAFETY WARNING

Removing the lid will expose you to potentially dangerous voltages! Disconnect the amplifier from the mains supply and do not touch any heatsinks as they may still be at a high potential!


After removing the lid and with the rear panel facing you, locate the input circuit board as shown below – it is attached to the input and RS485 XLR connectors. Find the two sets of links as marked by the arrows, and move them as shown to set the gain as required.



HD103 sets the gain for channel A, and HD203 sets the gain for channel B. We recommend both channels are set to the same position!

Adjusting the Amplifier's Absolute Gain (Ti-4250)

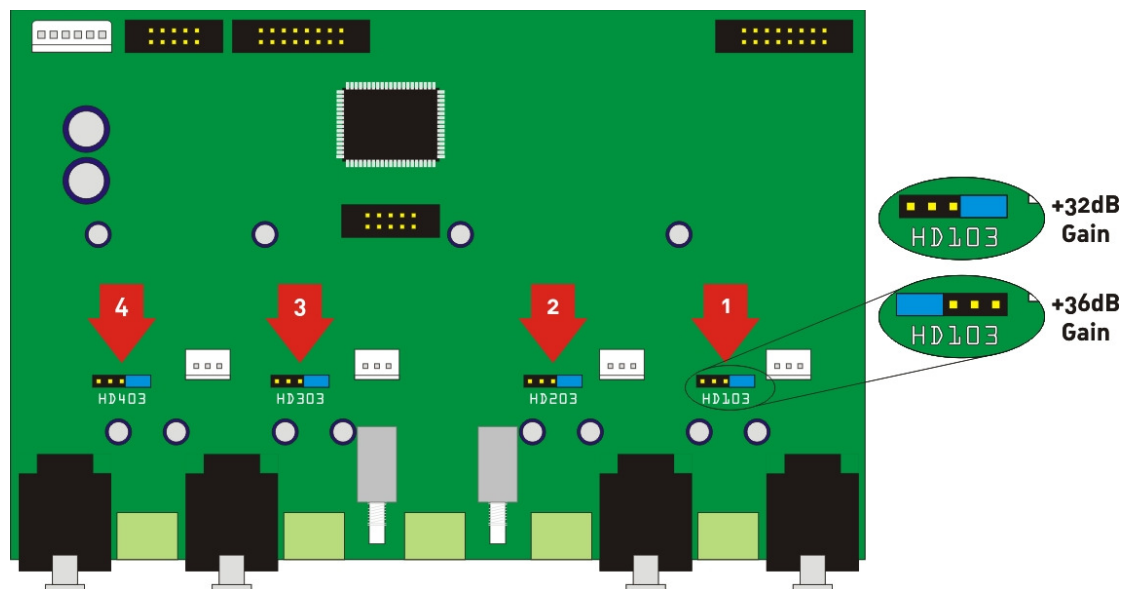
The voltage gain of the amplifier can be selected to be either +32dB (standard) or +36dB to match system sensitivity as required. This is achieved by setting links on the input board internally.



SAFETY WARNING

Removing the lid will expose you to potentially dangerous voltages! Disconnect the amplifier from the mains supply and do not touch any heatsinks as they may still be at a high potential!

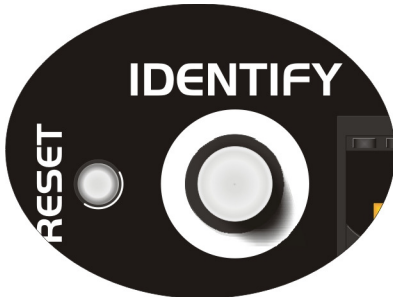
After removing the lid and with the rear panel facing you, locate the input circuit board as shown below – it is attached to the input and RS485 XLR connectors. Find the four sets of links as marked by the arrows, and move them as shown to set the gain as required.



HD103 sets the gain for channel A, and HD203 sets the gain for channel B and so on. We recommend all channels are set to the same position to avoid confusion!

Resetting the Amplifier to Factory Defaults

If for any reason you need to set the amplifier back to its factory default settings, there are three levels of reset available. These are performed using either the rear panel reset switch or the internal reset link. The internal reset link's location is described overleaf.



The external user reset is performed by holding in the reset switch on the rear of the amplifier whilst powering it up. The "POWER" and "BRG" LEDs will alternately flash for a 3 seconds to show the default settings have been loaded.

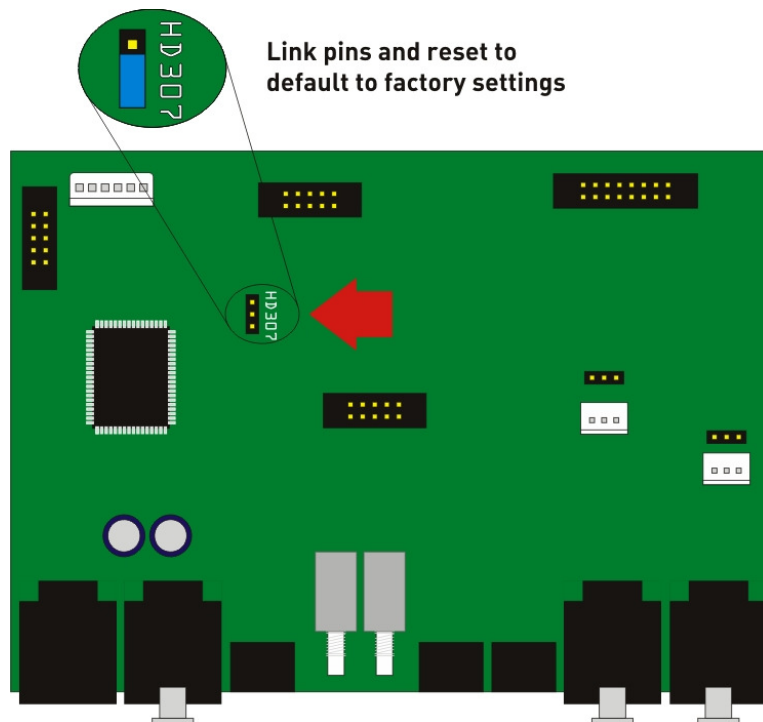
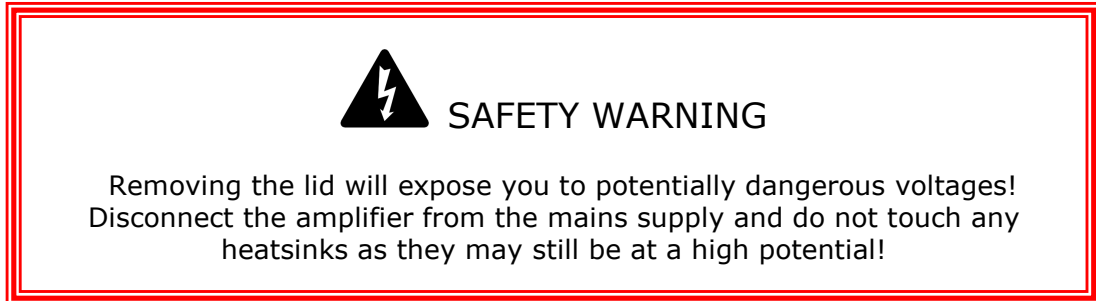
The following settings are returned to default values using this method:

Mode: Stereo;
Mutes: OFF;
Digital gain controls: 0dB;
Power on Delay Time: 5 seconds;
GP Output: A/P Monitor;
GP Relay: Follows G/P Out;
GP Input: Disabled;
Temperature Warning: 95°C;
Amplifier Name: "Amplifier Network Name Has Not Been Set!";
Channel Names: A = "Output Channel A", B = "Output Channel B"
Load monitoring is disabled and impedance alarms are set to 0.

The internal user reset is performed by moving the link as explained overleaf.

Dual Channel Amps Internal Reset

After removing the lid and with the rear panel facing you, locate the input circuit board as shown below – it is attached to the input and RS485 XLR connectors. Find the link as marked by the arrow, and move it as shown to reset.



Next, turn the amplifier back on – if the link is in the reset position, the “POWER” and “BRG” LEDs will alternately flash for a 6 seconds to show the default settings have been loaded. The amplifier will then start as normal.


In addition to the parameters reset using the external user reset, the internal user reset will also zero the system up timers, the power cycles counter, and the max. temperature record.

A full factory reset is also available – please contact us for more details.

Remember to restore the link before refitting the cover, or it will set the amplifier to default settings every time it is powered up!

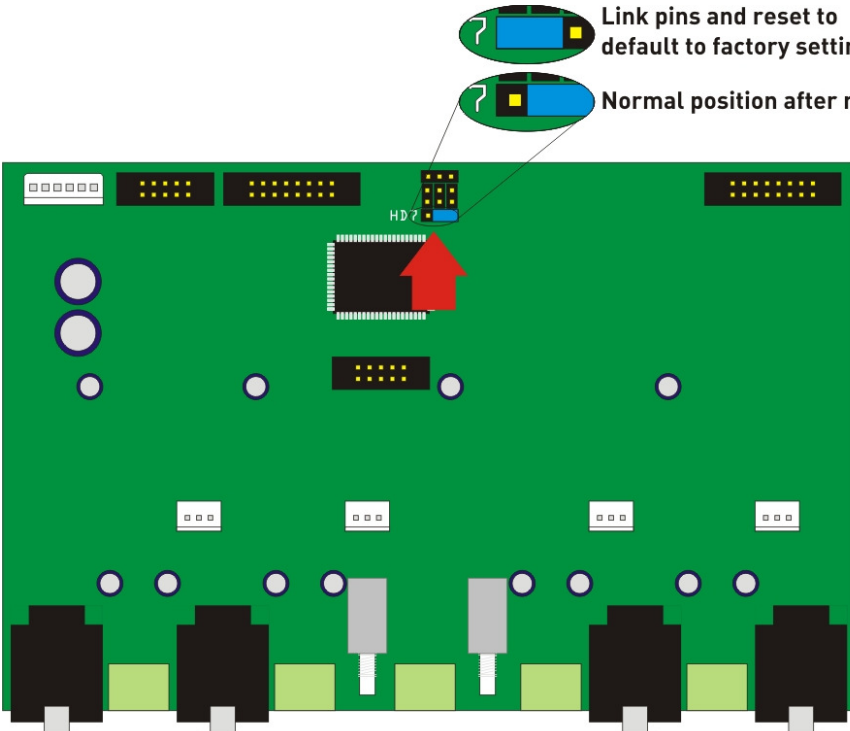
Ti-4250 Internal Reset

After removing the lid and with the rear panel facing you, locate the input circuit board as shown below – it is attached to the input and RS485 XLR connectors. Find the link as marked by the arrow, and move it as shown to reset.



SAFETY WARNING

Removing the lid will expose you to potentially dangerous voltages!
Disconnect the amplifier from the mains supply and do not touch any
heatsinks as they may still be at a high potential!



Next, the

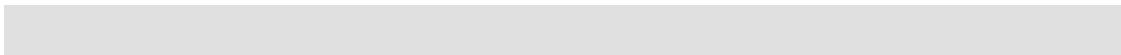
turn

amplifier back on – if the link is in the reset position, the “POWER” and “BRG” LEDs will alternately flash for a 6 seconds to show the default settings have been loaded. The amplifier will then start as normal.

In addition to the parameters reset using the external user reset, the internal user reset will also zero the system up timers, the power cycles counter, and the max. temperature record.

A full factory reset is also available – please contact us for more details.

Remember to restore the link before refitting the cover, or it will set the amplifier to default settings every time it is powered up!



Appendix II: Updating Amplifier Firmware

Overview

The firmware that runs the amplifier hardware and controls the remote comms may be updated via the RS485 network using the loader engine built into **iCORE**. Before explaining how to update the firmware, please note that

ONLY ONE AMPLIFIER/BREAKOUT BOX MAY BE UPDATED AT A TIME – TURN OFF ALL OTHER CONNECTED UNITS DURING THE UPDATE PROCEDURE!

The other devices on the network don't need to be physically disconnected, just turned off (NOT STANDBY – **OFF!**) so that **iCORE** can determine which model it has to update and confirm the update has been a success.

Note that units cannot be updated over the audio transport bridge (i.e. via another Breakout box) and must be directly connected to the local RS485 network from the computer.

In the majority of cases firmware updates will be performed within **iCORE**, but should there be a problem during the update such as the connection being broken, the power being lost, or a computer crash then there is a back-up method to rescue the situation. See page 58 for details of this if required.

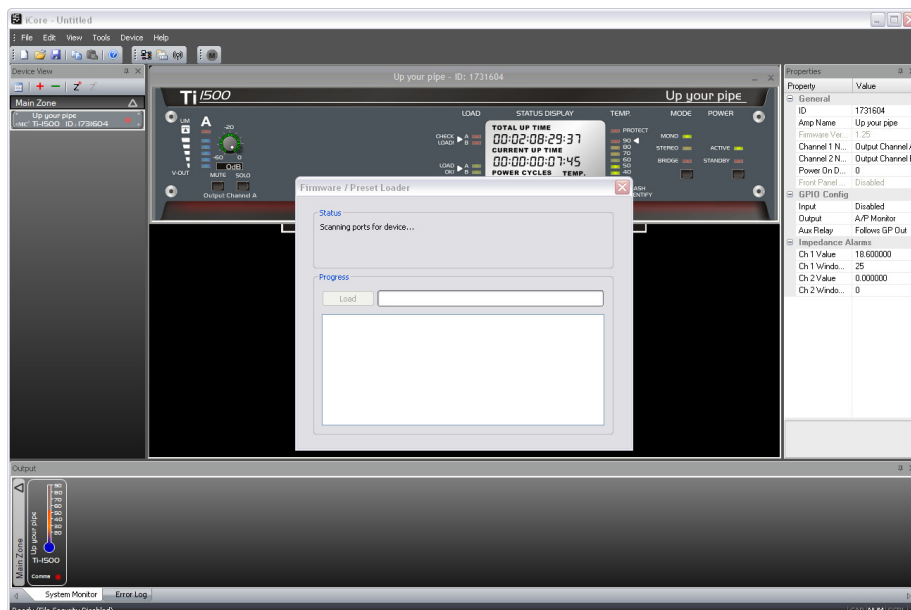
Update Procedure Using iCORE

Before starting any updates...

SWITCH OFF ALL UNITS ON THE NETWORK (AMPS AND BREAKOUTS) APART FROM THE ONE TO BE UPDATED!

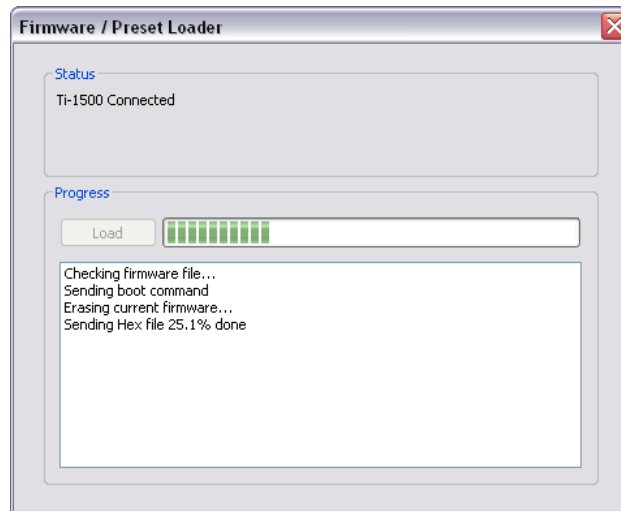
CLOSE ALL OTHER OPEN PROGRAMS ON YOUR COMPUTER!

Now, in **iCORE**, select Tools ⇒ Preset/Firmware Loader. You must be OFF-LINE for this choice to be available.



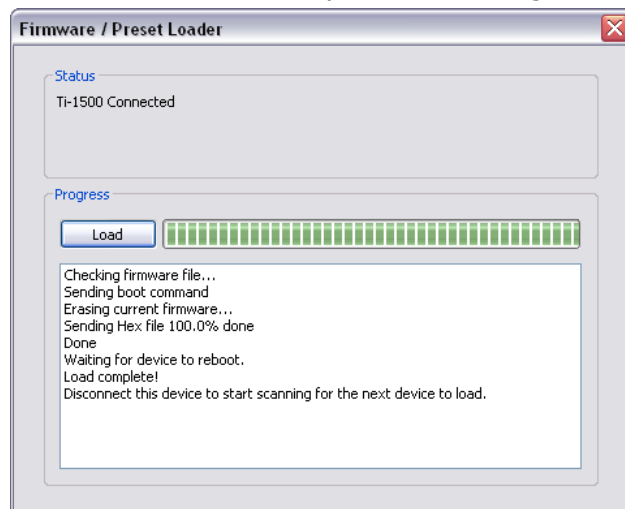
The loader will start scanning for all connected devices to determine what unit it has to update. After a few seconds the amplifier will be found and identified (its Power LED will begin to flash yellow). Check the model number which will be shown in the status pane, and if OK, press the "Load" button.

If the amplifier is active it will power down immediately, and the update will start.



**DO NOT START ANY OTHER PROGRAMS DURING THE UPDATE!
DO NOT DISCONNECT THE AMPLIFIER DURING THIS PROCEDURE!**

During the update the "limit" LEDs will be illuminated and the Comms LED will flicker. The update takes less than 90 seconds and when complete, the amplifier will reboot automatically, and a message will confirm that the update is complete.



If there are multiple units to update, then simply turn off the completed one and switch on the next one – **ICORE** will find it as before and just press "Load" again to update the unit.

Repeat this procedure for all units as required.

Remember that units cannot be updated over the audio transport bridge (i.e. via a breakout box, and must be directly connected to the RS485 network from the computer.

Recovery Update Procedure

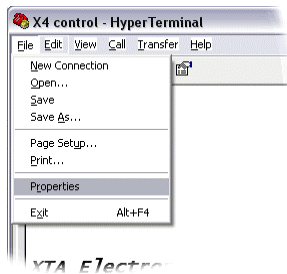
If there was a problem during the update procedure, or iCore is not available, it is possible to update the amplifier in "boot-load" mode using a basic terminal program, provided a copy of the firmware is available.

We recommend using HyperTerminal, which is always built into Windows. This is accessed via:

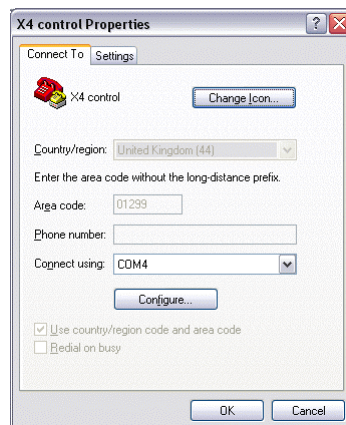
start ⇒ All Programs ⇒ Accessories ⇒ Communications ⇒ HyperTerminal

The COM port settings for the HyperTerminal session need to be set up to correspond to the amplifier's requirements in boot-load mode.

Click on File ⇒ Properties in the HyperTerminal window.



This will display the connection details as below. Change the COM port number from the default to the appropriate one for your PC configuration.



Press "Configure" and make sure the port settings are:

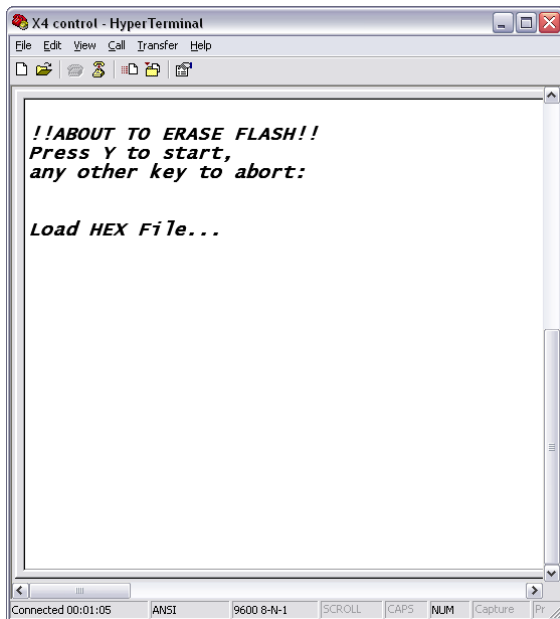
9600 Baud, 1 Stop Bit, No Parity

Press OK to accept these settings and then OK to close the Properties window.

It should now be possible to connect to the amplifier to begin the boot-load procedure.

ONLY ONE AMPLIFIER/BREAOUT BOX MAY BE UPDATED AT A TIME – TURN OFF ALL OTHER CONNECTED UNITS DURING THE UPDATE PROCEDURE!

To force the amplifier into boot-load mode, press the Identify button on the rear panel and hold it in whilst turning the amplifier on. The LIM LEDs will both illuminate and the COMMS LED will be RED. A message should appear in the HyperTerminal window:

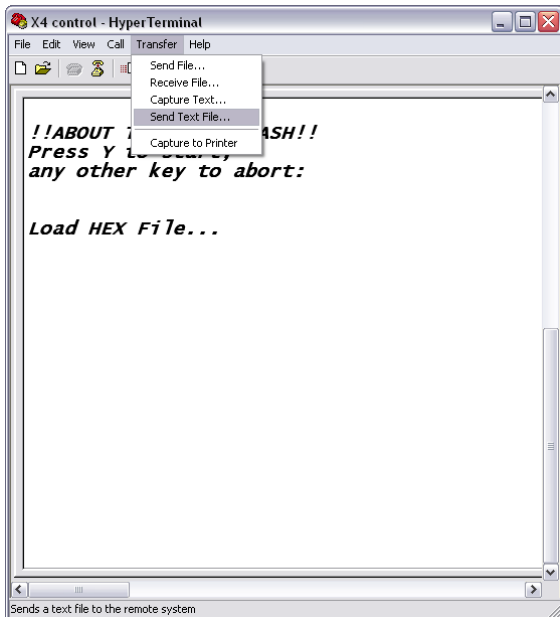


Pressing "Y" on the keyboard will then erase the current firmware and prompt for a new version to be loaded.

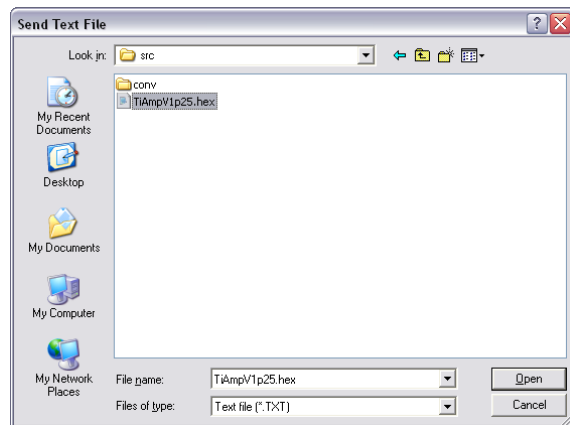
If you want to cancel this before the erase procedure, just press any another key or turn the amplifier off.

Otherwise, press "Y" – the COMMS LED will turn green and the message will be updated with "Load HEX file..." as shown here.

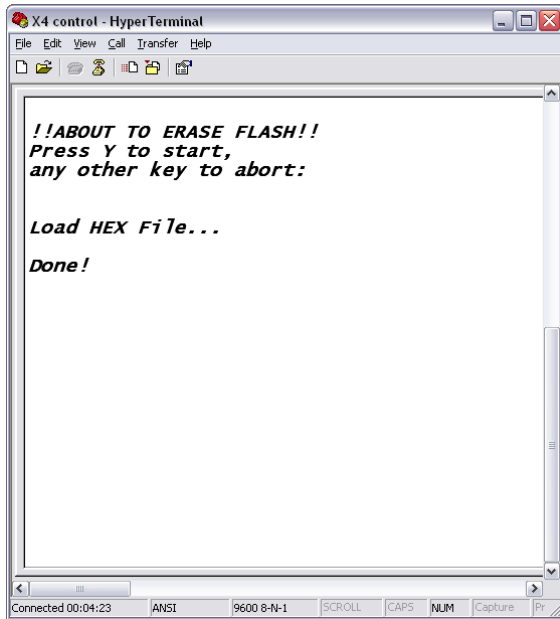
From the menu, select Transfer ⇒ Send Text File and point the program to the



location of the amplifier firmware file. The file type by default on the file select window is "txt" – change this to "hex" to ensure the firmware can be located.



Pressing "Open" when the file has been located will start the load procedure immediately. The COMMS LED on the amplifier will begin to flash quickly in yellow. The load will take under 90 seconds. When complete the HyperTerminal window will show



and the amplifier will reboot.

You may keep the window open and repeat the procedure for any other connected amplifiers – the program will remember the location of the hex file.

It is recommended that you save the settings in HyperTerminal if you might need to boot-load any other devices.

Appendix III: Maintenance

The amplifier will require little in the way of routine maintenance, apart from occasional routine checking of the fan outlets on the rear panel, and possible cleaning of the foam inserts on the front panel.

The fans should be cleaned with the amplifier turned OFF. Simply brush any debris collected off the rear guards with a soft brush (a half inch paintbrush is ideal), whilst holding a vacuum cleaner nozzle over them.

Remove the front panel inserts by pushing them up vertically through the bottom of the aperture. Shake or brush them to remove any dry collected particles and if necessary, rinse them in warm water with a small amount of detergent. This will remove any greasy build-up. Make sure they are thoroughly dry before reinserting them!

Cleaning the casework should only be done with a cloth lightly damped with water only. The use of chemical cleaners may damage the paint finish or dissolve printing!

Appendix IV: Specifications

Connections:

Audio in: 2 x XLR & Phoenix
 Network I/O: 2 x XLR & Phoenix
 GPIO Port: 6 way mini-Phoenix
 Speaker out: 2 x Speakon

GPI Port:

Maximum input voltage: 24V
 Minimum input voltage 0V
 Isolated relay rating: DC: 2A, 28V, 60W / AC: 0.5A, 125V, 60VA

Audio performance:

	Ti500	Ti1000	Ti1500	Ti2000	Ti3500	Ti4250
Power (8R) Watts/ch.	215	450	575	625	1000	160
Power (4R) Watts/ch.	375	750	1025	1150	1850	300
Power (2R) Watts/ch.	N/A	1150	1750	2100	N/A	475 (C&D only)
Hum & Noise dB	< -103	< -104	< -105	< -106	< -106	< 104
Sensitivity dBu/Volts	+2.0/1.00	+3.5/1.20	+5.5/1.46	+7.5/1.80	+9.0/2.20	+2.0/1.0

Input CMR: > 60dB

Gain: 32dB (Switchable to 36dB)

Frequency Response: 20Hz – 20kHz (+0dB, -0.5dB)

THD: (@1dB below maximum output power), 1kHz: 0.008% (20Hz – 20kHz)

Power supply requirements:

	Ti500	Ti1000	Ti1500	Ti2000	Ti3500	Ti4250
Power Consumption 120V Nominal	2.0A	3.8A	5.2A	5.6A	8.4A	2.0A
Power Consumption 240V Nominal	1.0A	1.9A	2.6A	2.8A	4.2A	1.0A

Dimensions:

482 x 428 x 88mm (WxDxH)

Weight:

	Ti500	Ti1000	Ti1500	Ti2000	Ti3500	Ti4250
Net Unit kg	13.2	14.2	19.7	20.5	22.5	13.4
Boxed kg	15.0	16.0	21.2	22.3	24.4	13.9

MC2 Audio reserves the right to change and improve the specifications without notice.

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