

MC<sup>2</sup> AUDIO Ltd.,  
Units 6-8 Kingsgate,  
Heathpark Industrial Estate,  
HONITON,  
Devon EX14 1YG  
England

Tel: ++(0)1404.44633  
Fax: ++(0)1404.44660  
[www.mc2-audio.co.uk](http://www.mc2-audio.co.uk)



© MC<sup>2</sup> Audio Ltd 2009

Waring Hayes 07/09  
If you have any comments or suggestions about this manual, please  
contact MC<sup>2</sup> at the address above, or email [warig@xta.co.uk](mailto:warig@xta.co.uk)



## Contents

|  |           |
|--|-----------|
| Important Safety Information.....                    | 5         |
| Thanks .....   | 6         |
| Unpacking the unit.....                              | 6         |
| Introduction.....                                    | 7         |
| Installation.....                                    | 8         |
| Operation.....                                       | 9         |
| Front Panel Indicators.....                          | 10        |
| <i>1: Power On Indicator.....</i>                    | <i>10</i> |
| <i>2: Network Indicators.....</i>                    | <i>10</i> |
| <i>3: RS485 Comms Indicators.....</i>                | <i>10</i> |
| <i>4: Network Type Badge.....</i>                    | <i>10</i> |
| Rear Panel Controls, Connections and Indicators..... | 11        |
| <i>1: Mains Power Inlet and Power Switch.....</i>    | <i>11</i> |
| <i>2: RS485 Local Comms Connection .....</i>         | <i>11</i> |
| <i>3: Power Fail Audio Input.....</i>                | <i>11</i> |
| <i>4: Balanced Audio Outputs.....</i>                | <i>11</i> |
| <i>5: Network Transport Connections.....</i>         | <i>12</i> |
| <i>6: Ethersound Extra Network Connection.....</i>   | <i>12</i> |
| <i>7: Identify Switch .....</i>                      | <i>12</i> |
| <i>8: General Purpose Interface (GPI) Port.....</i>  | <i>12</i> |
| Getting Audio Out of the Box, Out of the Box.....    | 13        |

|  |           |
|--|-----------|
| Remote Control and Monitoring .....                                  | 14        |
| Overview .....   | 14        |
| Remote Control On-line via a Computer with <b>iCORE</b> .....        | 14        |
| Introduction to <b>iCORE</b> – a crash course (not literally).....   | 17        |
| <i>Going on-line for the first time .....</i>                        | <i>17</i> |
| <i>Layout of the Main Window.....</i>                                | <i>19</i> |
| <i>Breakout “Front Panel” Controls, Readouts and Indicators.....</i> | <i>25</i> |
| Remote Monitoring and Control On-line via RS485/Ethernet .....       | 26        |
| Remote Monitoring Off-line with a Breakout Box.....                  | 29        |
| The GPI Port.....  | 31        |
| Overview .....   | 31        |
| <i>Setting a Breakout box to “Network Master”.....</i>               | <i>32</i> |
| <i>“Network Master” Pulsed Mode.....</i>                             | <i>33</i> |
| <i>“Network Master” Latched Mode.....</i>                            | <i>33</i> |
| <i>Additional Functions of the GPI port – Mute and Standby.....</i>  | <i>34</i> |
| Switching Between 48kHz and 96kHz .....                              | 35        |
| Resetting the Breakout box to Factory Defaults .....                 | 36        |
| Appendix I: Updating Device Firmware.....                            | 37        |
| Overview .....   | 37        |
| <i>Update Procedure Using <b>iCORE</b>.....</i>                      | <i>37</i> |
| <i>Recovery Update Procedure.....</i>                                | <i>39</i> |
| Appendix II: Maintenance.....  | 42        |
| Appendix III: Specifications.....                                    | 42        |
| Index.....   | 43        |



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 Information

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 |

TO PREVENT THE LIKELIHOOD OF SHOCK OR FIRE HAZARD, DO NOT EXPOSE THE UNIT TO RAIN OR MOISTURE.

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

TO AVOID ELECTRICAL SHOCK DO NOT REMOVE COVERS. REFER ALL SERVICING TO QUALIFIED PERSONNEL.

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.

ALWAYS OPERATE THE UNIT WITH THE AC GROUND WIRE CONNECTED TO THE ELECTRICAL SYSTEM GROUND. Precautions should be taken so that the means of grounding of a piece of equipment is not defeated.

[DO NOT REMOVE THE LID. Removing the lid will expose you to potentially dangerous voltages. There are no user serviceable parts inside.]

## Thanks

Thank you for choosing an MC<sup>2</sup> **Ti Series** Breakout box for your application. Please spend a little time reading through this manual, so that you obtain the best possible performance from the unit.

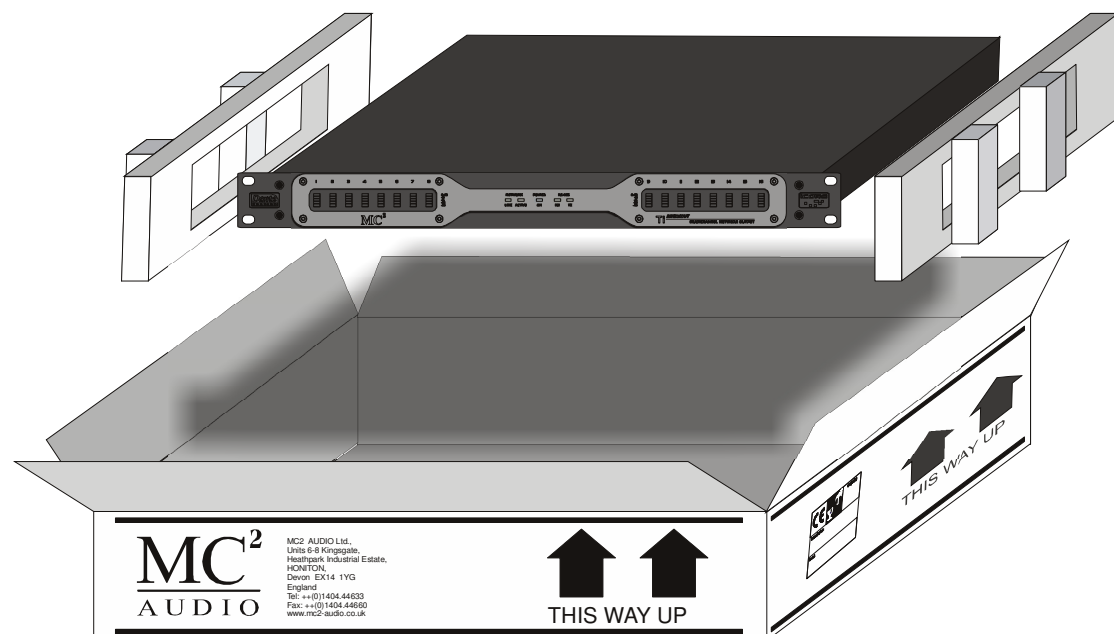
All MC<sup>2</sup> products are carefully designed and engineered for cutting-edge performance and world-class reliability. If you would like further information about this or any other MC<sup>2</sup> product, please contact us.

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



## Unpacking the unit

After unpacking, please check the unit 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** Breakout box is a multi-channel analogue output device, designed to work with the most popular network audio protocols, and offers 8 or 16 channels of high performance audio outputs.

Additionally, the unit may be connected to a computer through **iCORE**, the software package designed to integrate with all the **Ti Series** devices. This opens up remote control of the unit's output levels and allows outputs and the unit itself to be named on the network for easy identification.

A programmable GPIO port allows for off-line monitoring of **Ti Series** amplifiers and other Breakout boxes on the network. The configuration of this port is programmable through **iCORE**, allowing the unit to integrate easily with voice evacuation and building management systems.

The RS485 communications from the computer are bridged automatically onto the Ethernet based audio network, allowing any Breakout to act as an off-line monitor.

## Installation

### Electrical Considerations

The Breakout box 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 incorrect AC voltage is not covered by the warranty.**

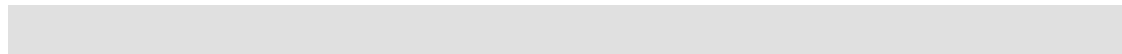
### Mechanical Considerations

To ensure that this equipment performs to specification, it should be mounted in a suitable rack or enclosure.

When mounting the unit in a rack or enclosure, ensure that there is adequate ventilation. The cooling fan sucks cool air in through the RHS and blows warm air out of the LHS of the unit through the ventilating grills.

Take care when mounting other equipment in the same rack.

Please also refer to the maintenance section on page 37 of this manual.





## Operation

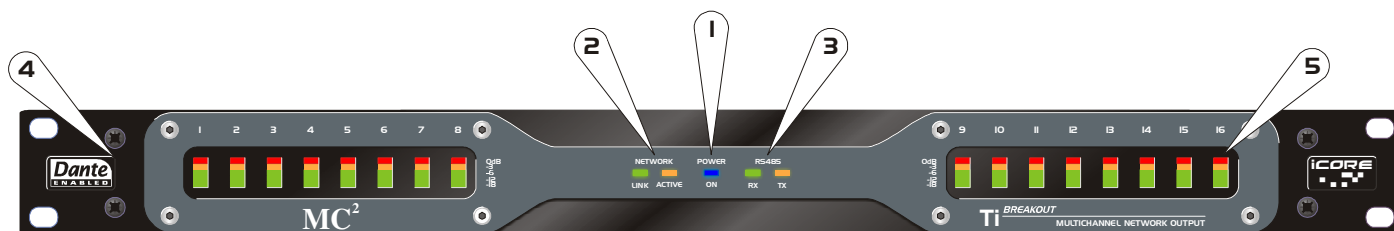
Read all documentation before operating your equipment and retain all documentation for future reference.

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 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 37 of this manual.)

## Front Panel Indicators



### *1: Power On Indicator*

This illuminates shortly after power up, following the system checks, and shows that the network card is present and functioning correctly. One flash at start-up means 48kHz sample rate, two flashes means 96kHz. Please see page 35 for how this can be changed. This LED will also flash when the unit is scanned when going on-line remotely with **iCORE**, or if the “Identify” button is pressed. Please see page 12 for more details of this feature.

### *2: Network Indicators*

The “Link” and “Activity” LEDs follow those on the network card and will illuminate when a network connection is present and detected by the card.

### *3: RS485 Comms Indicators*

The RX and TX LEDs show comms activity on the RS485 bus, and are also used in conjunction with the the Network LEDs to show master mode configuration on start-up – see page 33 for more details of this.

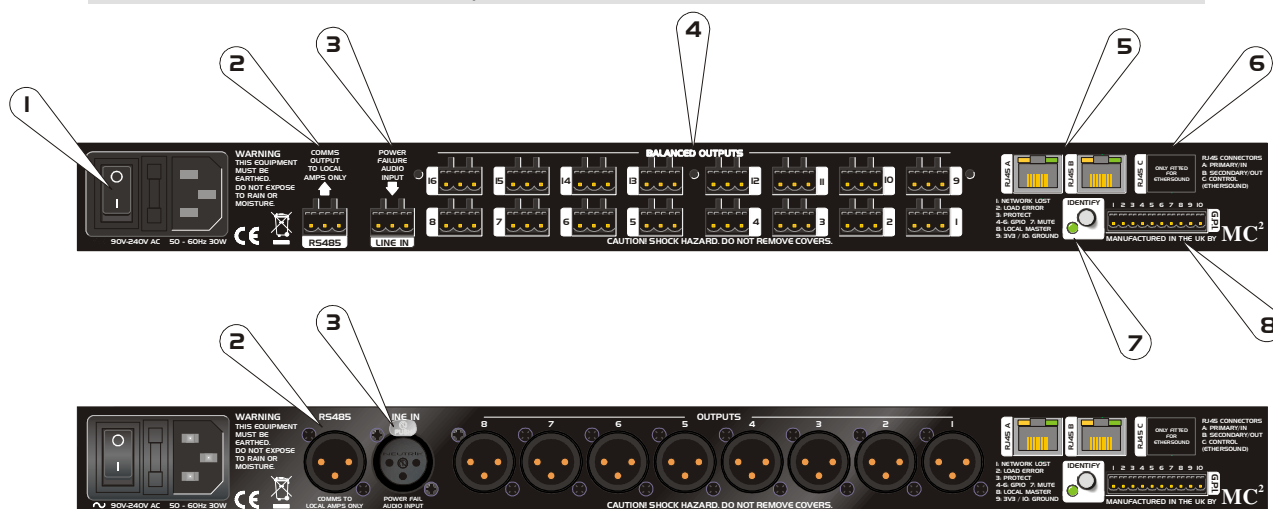
### *4: Network Type Badge*

The badge denotes the fitted network card – please note that a firmware update will be required if the network card is changed. Please see page 37 for more information on this.

### *5: Output Metering*

These analogue meters show the absolute output level for each channel on the unit and are affected by remote level control adjustments and mutes. They are for approximate signal indication only and not designed for system alignment.

## Rear Panel Controls, Connections and Indicators



### 1: Mains Power Inlet and Power Switch

The mains fuse is also located here, between the switch and the power socket – only replace with the correct rated fuse – see page 42 for details.

### 2: RS485 Local Comms Connection

The connection of other Ti Series units (amplifiers and Breakout boxes) is **only** for local units – other components that are located on different parts of the network will have their comms “tunnelled” via the network audio transport.

The pin-out of this connector is:

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

The procedure for setting up a remote network is explained in detail starting on page 14 of this manual.

### 3: Power Fail Audio Input

This input is wired in parallel to all outputs and will be switched over automatically to allow for emergency operation in the event of a power failure.

### 4: Balanced Audio Outputs

These outputs (either 8 or 16) provide the breakout audio from the network connection and are wired

- Pin 1: Screen/Ground
- Pin 2: Hot (signal +)
- Pin 3: Cold (signal -)

## 5: Network Transport Connections

Depending on the chosen audio network there will be either two (Dante or Cobranet) or three (Ethersound) connectors available to connect up to the Ethernet based network. Please see the appendices starting on page 37 for information on your chosen network.

### *6: Ethersound Extra Network Connection*

This socket is only available if an Ethersound card is fitted. Please see Appendix II on page **Error! Bookmark not defined.** for more information.

### *7: Identify Switch*

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

Within the **iCORE** software, pressing this switch will cause the Breakout's "panel" to flash on screen, along with the "POWER" LED on the front panel flashing for five seconds.

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

This switch is also used to force the unit into "boot load" mode to upgrade the internal firmware. Normally, this can be achieved through **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 39 for more information.

Switching between 48kHz and 96kHz operating modes is also actioned by pressing and holding this switch - see the section on page 35 for more details.

### *8: General Purpose Interface (GPI) Port*

This port is used to control various functions when the unit is in "Master Mode" and monitoring other connected components. It is also used for control signal outputs in this mode. Please see the section on page 31 for more details of how this works.



## Getting Audio Out of the Box, Out of the Box...

Connect XLR or Phoenix terminated cables to the outputs as appropriate and plug in the power. Connect an appropriate network cable to the network card and connect to a network.

After power-up, the Network "Link" and "Activity" LEDs on the front panel should be illuminated – "Link" on steady and "Activity" flashing.

The card is now ready to be configured – that is, the channels available on the network audio stream selected and routed to the appropriate outputs.

The Breakout box supports the three most popular network audio transports, namely Ethersound, Cobranet and Dante. Only one of these is available and is dependant on the model of Breakout box – the badge on the front panel denotes what card is fitted to your unit.

Information about how to configure each type of card is given in the appendices at the back of this manual, starting on page 37.

By default all outputs are set to 0dB with mutes off, so once routing has been configured, all channels should output audio as required and the metering reflects the output level.

To preserve the dynamic range of the signal we advise you to run the box as "hot" as possible and attenuate "upstream" if needed. This will make the best use of the digital to analogue converters' wide dynamic range, and maximise the noise performance of the unit.

As the meters show dB from clip if the signal level sent down the network is peaking at approximately 0dBu, the signal may not show up on the meters, which read from -18dBfs (approximately +4dBu), so please be aware of this.



## Remote Control and Monitoring

### Overview

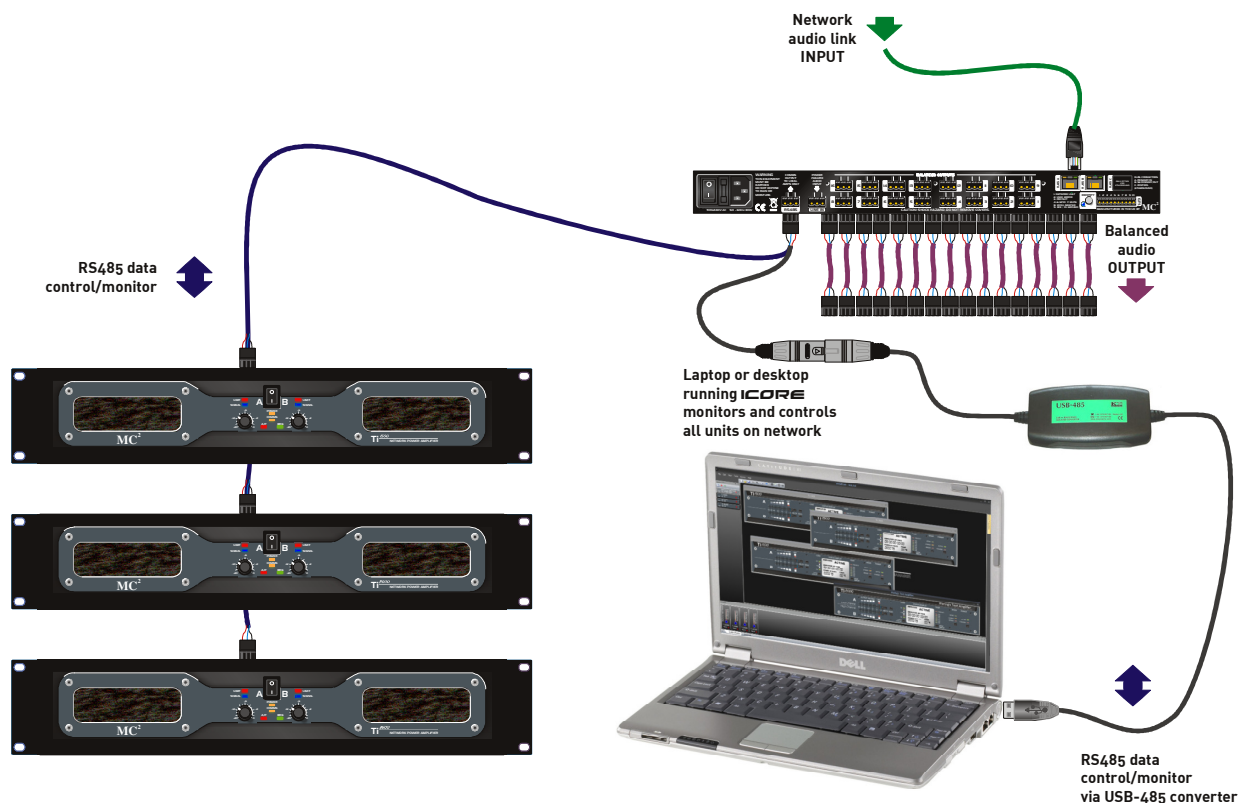
There are several methods of remote control available to the **Ti Series** Breakouts, allowing for various levels of system complexity. These may be thought of as:

- Remote Monitoring and Control *On-line* via RS485 and a PC with **iCORE**
- Remote Monitoring and Control *On-line* via RS485/Ethernet and a PC with **iCORE**
- Remote Monitoring *Off-line* with an additional Breakout box in "Master Mode" and an external control panel

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

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

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



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](http://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 below.

| 9-pin D type                 | XLR | Phoenix |
|------------------------------|-----|---------|
| Pin 4                        | 1   | 1       |
| Pins 3+7<br>(Brown + Orange) | 2   | 2       |
| Pins 8+2<br>(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. As the RS485 drivers used are “quarter load” devices, the maximum number of nodes that can be connected together is 128, and the maximum theoretical cable length from the first node to the last node is 1000 metres. This distance will be affected by the cable quality and to some extent the operating environment.

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 any connected **Ti Series** amplifiers.

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.

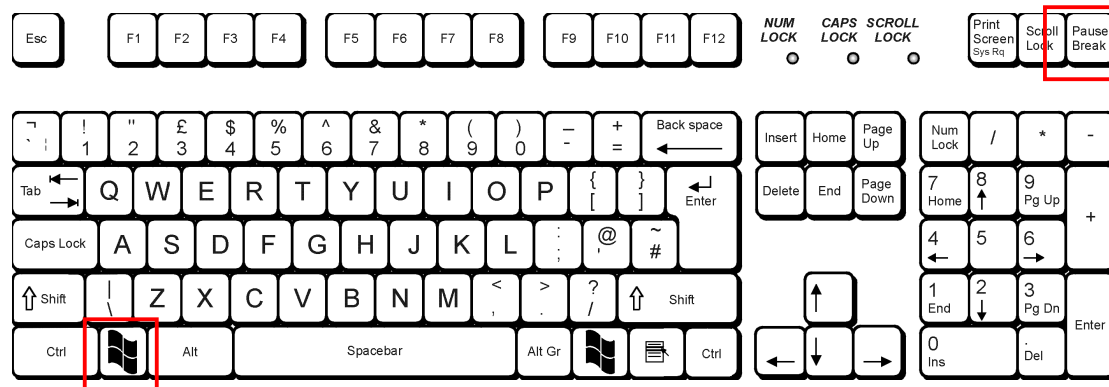


## Introduction to **iCORE** – a crash course (not literally)

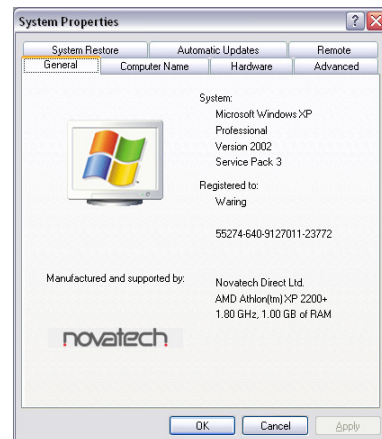
### *Going on-line for the first time*

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**.

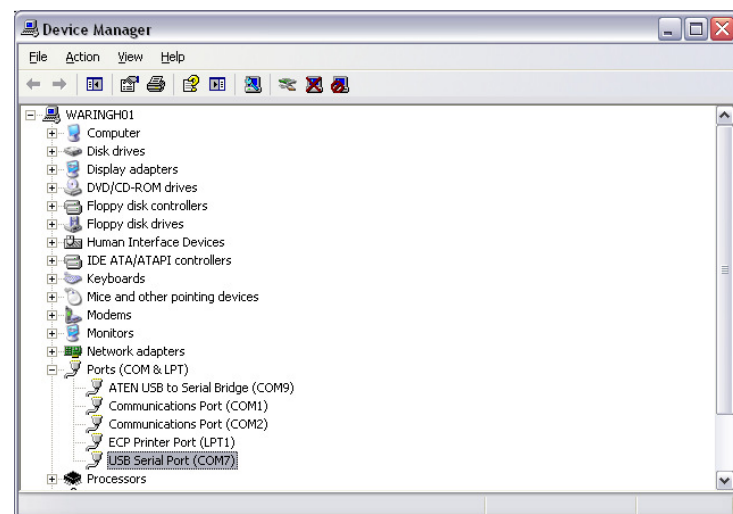
With the converter **plugged in (the COM port won't show up if the converter isn't connected!)**, use the shortcut of the Windows™ key on your keyboard + the Pause/Break key to bring up the System properties window:



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.

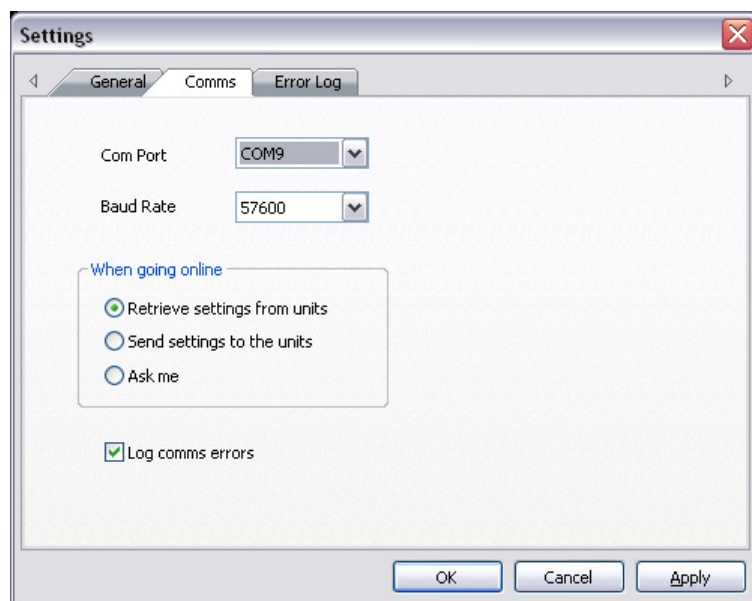


Make a note of this port number and then, open **iCORE**.

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.

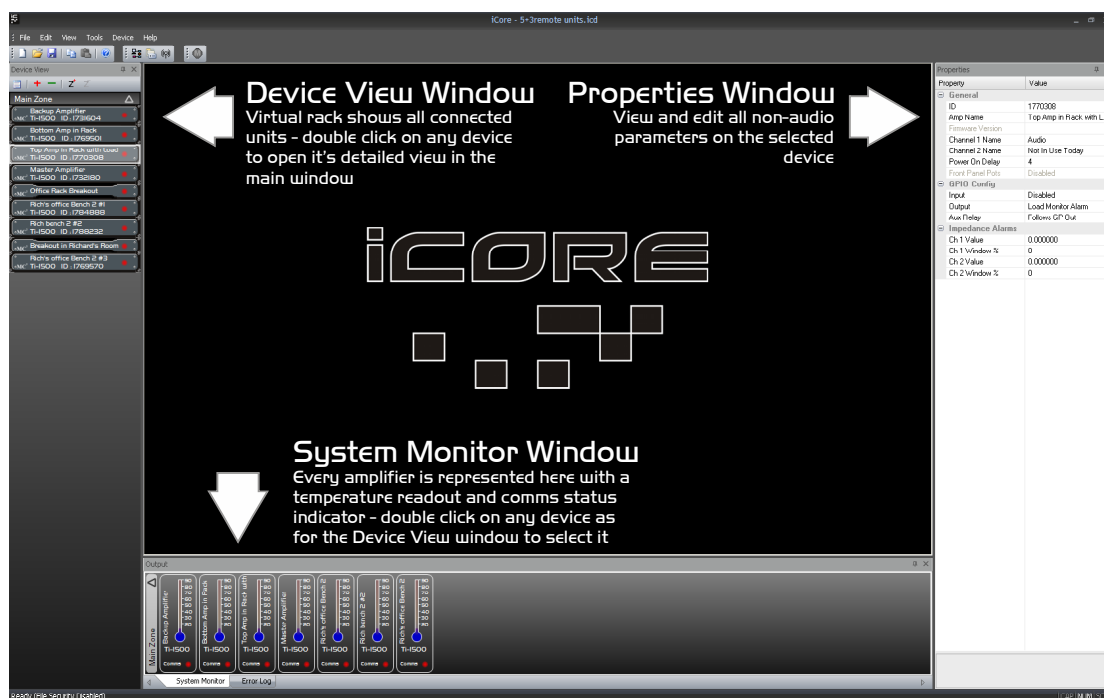


**The baud rate must remain at 57600 to ensure compatibility with all connected devices.**

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

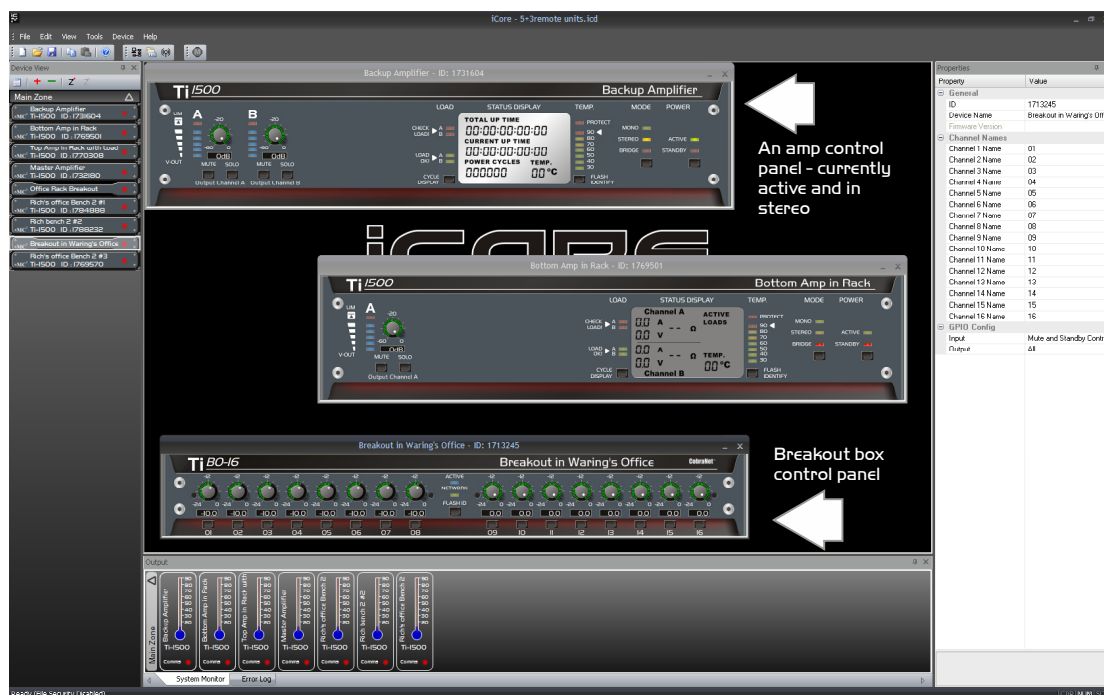
Having selected the COM port, this window may now be closed by clicking OK. We can now scan for connected devices and build up a list of all units on the network. Either select Tools ⇒ Autoscan, or press the button on the toolbar. As each device has a unique serial number IC built in, there is no need 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" pane 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 on 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 device'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.

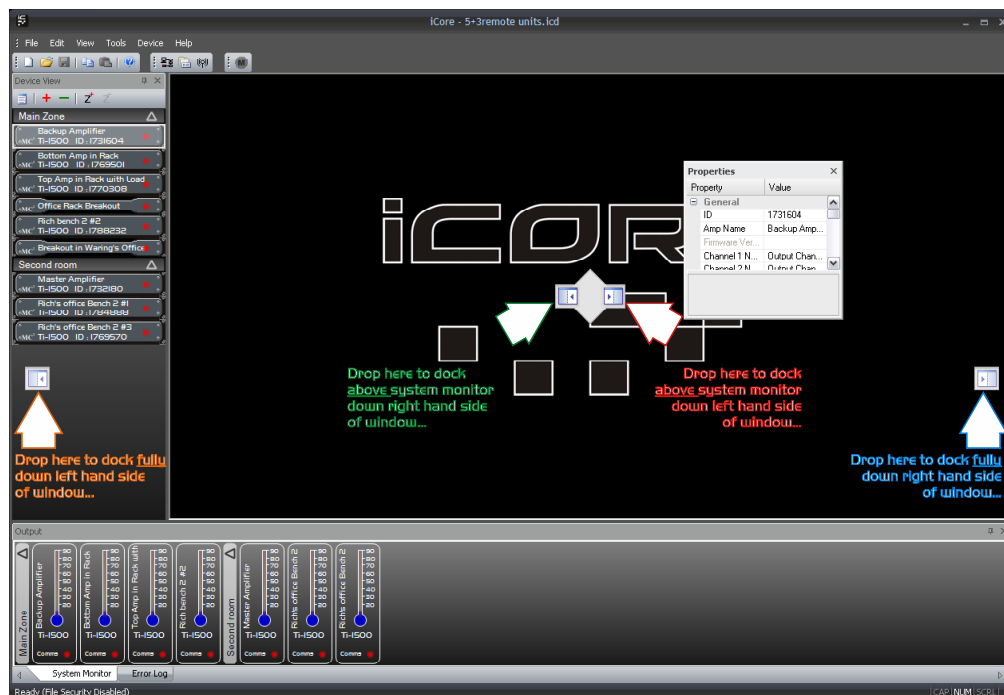
Remember to save your system before closing **iCORE** to avoid having to rescan the system every time you open the software. All window positions, zones, and screen layouts (so positions of the Device View, Properties and System Monitor) are also saved.

## Reorganising the Main Window

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



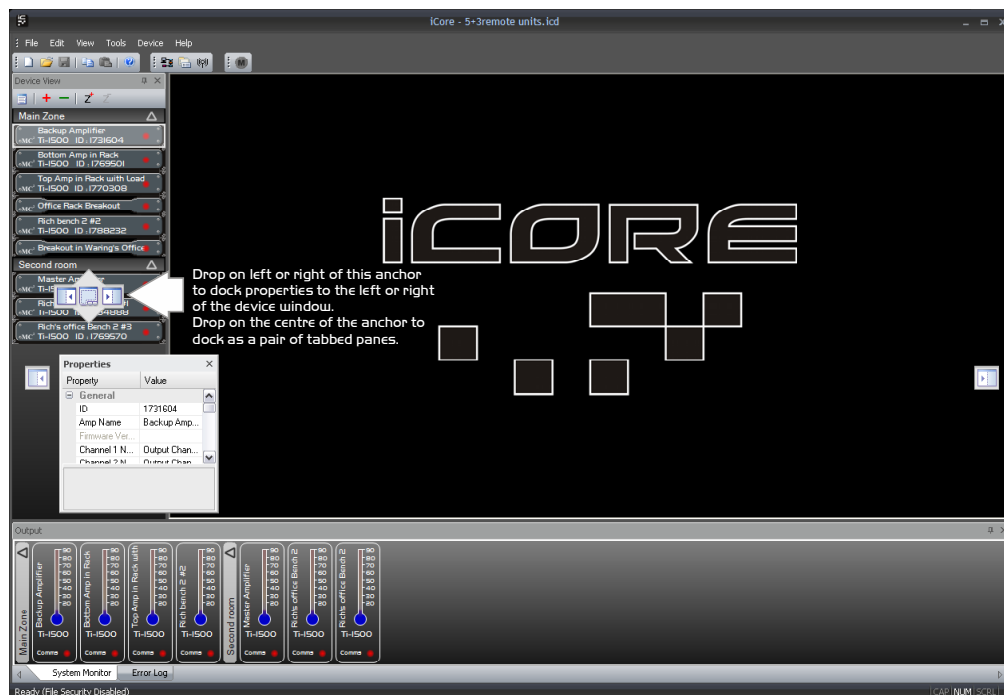
For example, to move the properties window and re-dock it, pick up the properties window by its title bar and begin to drag it. This will make a number of docking option anchors appear – these look like this:



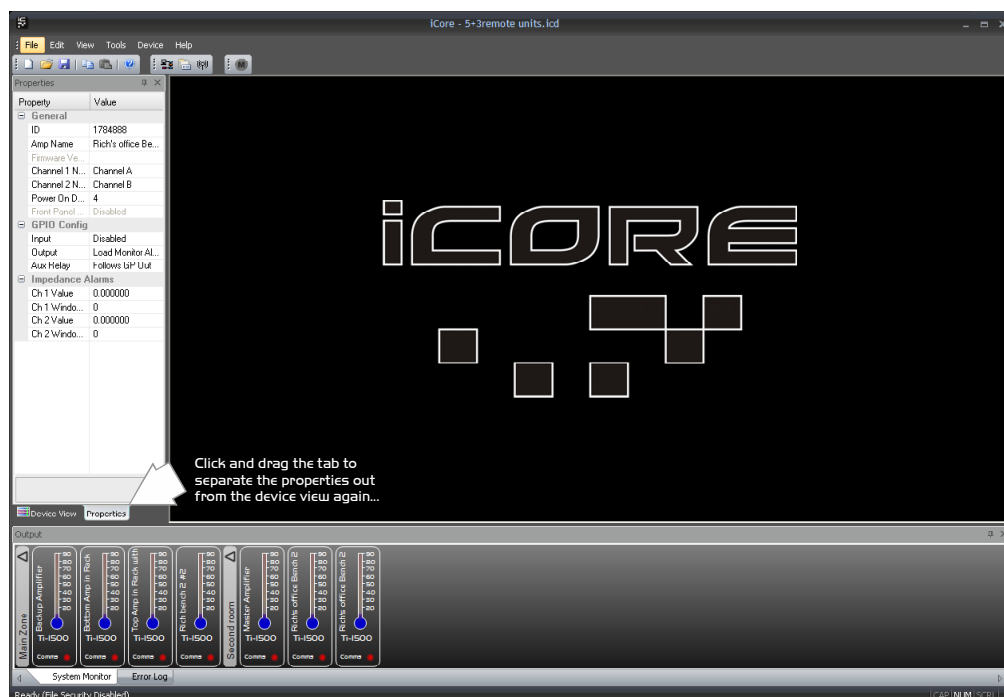
Drop the window on one of the anchors to dock it in the new position, as shown above. Similarly, the system monitor window can be docked either top or bottom

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.



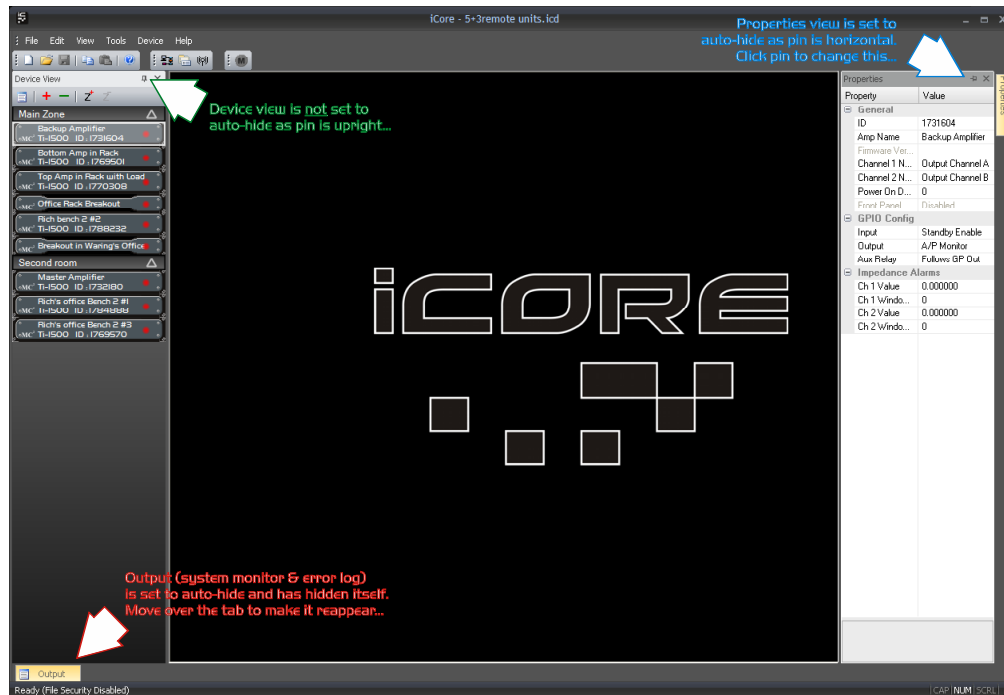
To separate out the windows again, just click on the tab of the window and drag and drop it as required to select a new position.



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.

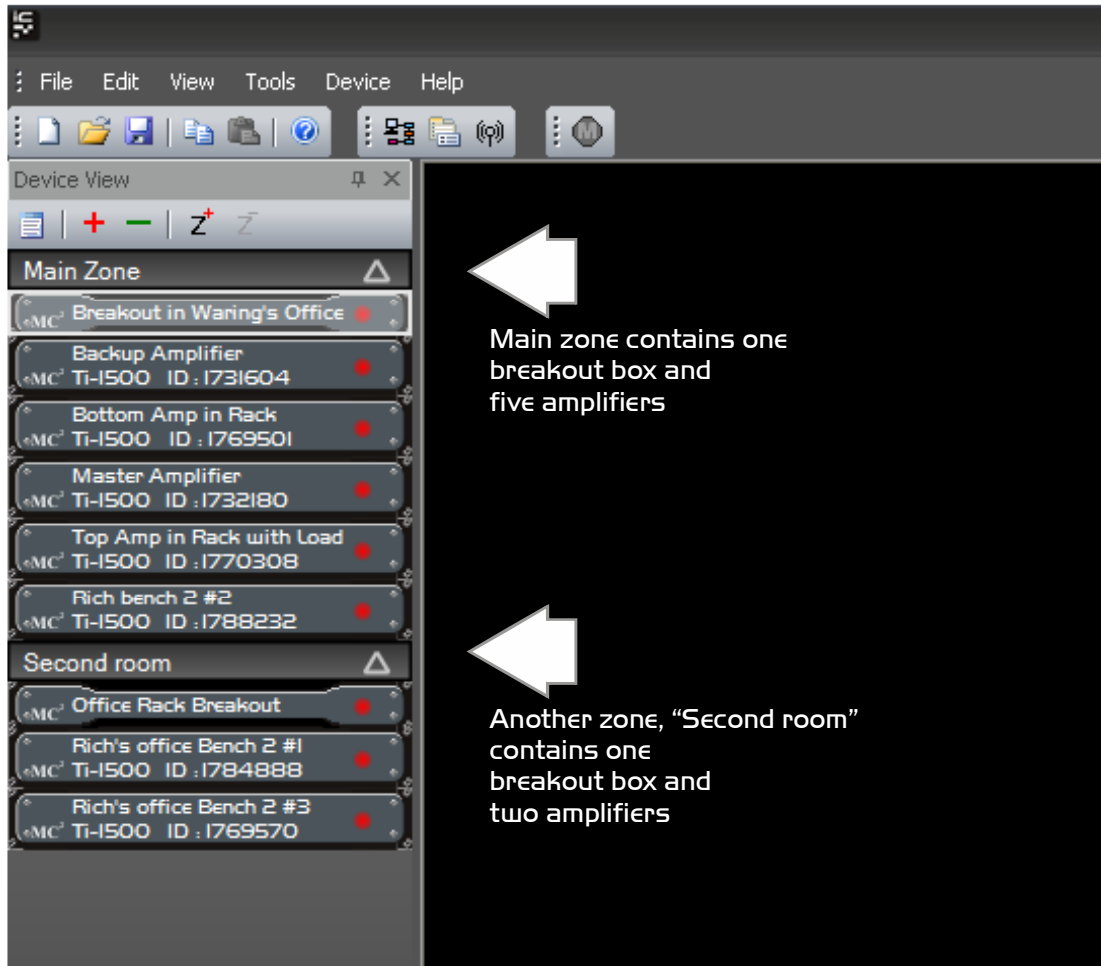


Remember, if any windows have been closed they can be reinstated through the menu View ⇒ Toolbars and Docking Windows.

## Zoning Devices

The zones shown in the Device View and System Monitor windows allow 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 re-ordered 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<sup>+</sup> 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 re-ordered within a zone in the same way.
- ✓ 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.



## Breakout “Front Panel” Controls, Readouts and Indicators



Double click a Breakout box in the device window to show the front panel. It is laid out as shown above – an 8 channel device is shown above, but the 16 channel is the same, except for twice as many controls! When on-line, the bottom “vent” glows green. If the Breakout box is off-line, perhaps due to a comms issue then this glow will change to red.

The controls, indicators and displays are:

- 1) Output level control: Clicking on this and dragging *vertically* will adjust the gain of the channel.
- 2) 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.
- 3) Output mute button: Cleverly, pressing this button will mute the selected channel’s output. Remember that this is stored in the Breakout box on power down, so unless you deliberately intend to keep a channel muted permanently, don’t leave a mute on and then close **iCORE**!
- 4) “Active” indicator: This will illuminate when the Breakout box is on-line and will flash for five seconds in response to a Breakout box having its “Identify” button pressed on the physical unit, or the “Flash ID” button is pressed on the panel here (see #6).
- 5) “Network” indicator: This will illuminate when the Breakout box has a valid audio transport network connection (i.e. something is plugged into the network card and is working correctly).
- 6) “Flash ID” button: Pressing this button will flash the “Power” LED on the physical unit for 5 seconds to help locate it on the network.
- 7) Output channel names: These names can be changed by either double clicking them on the panel, or through the Properties window. 16 chars max.
- 8) Device name: This can be changed by either double clicking it on the panel, or through the Properties window. 40 chars max.

### *Additional Device Properties*

All other 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 unit's unique serial number (Read only)  
                  *Device Name*: Click to edit the name of the unit  
                  *Firmware version*: Currently running unit firmware (Read only)

Channel names: Click to edit channel names

GPIO Config: *Input*: Enable or disable the GPI lines that can be used to control global mutes and global standby of connected amplifiers. See page 37 for more details.

*Output*: Choose how the GPI General Error output line behaves, when the unit is in "Network Master" mode. See page 32 for more details.

*Network Master Mode*: Choose how the general purpose output lines behave when the unit is in "Network Master" mode. See page 32 for more details.

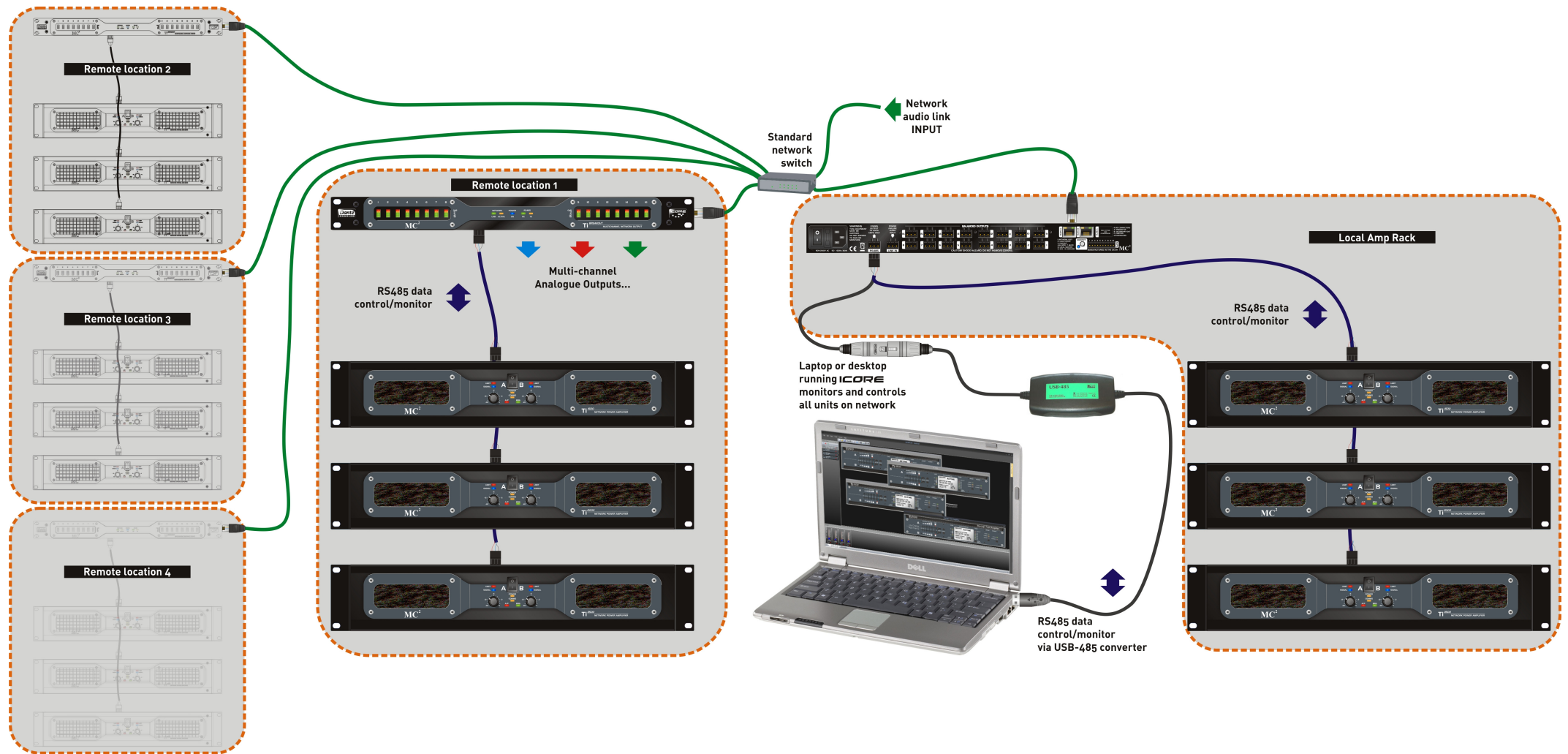
## Remote Monitoring and Control On-line via RS485/Ethernet

Breakout boxes utilise the ability of the network audio transport card to "bridge" the RS485 data onto the Ethernet network, so effectively "extending" the RS485 connection to any other Breakout boxes sharing the same audio network.

What this means in practice is that one PC directly connected to any local RS485 port on a Breakout is able to monitor and control all devices, without needing a direct physical RS485 connection to do so.

The diagram overleaf shows a typical large-scale system that utilises the ability of the Breakout boxes and network tunnelling to extend the reach of the RS485 network to each of the connected "nodes". Each node consists of a Breakout box and a group of **Ti Series** amplifiers. The network connection arrives at the Breakout box and the selected channels are converted into analogue audio and fed to their respective amplifier channels.

Additionally, the RS485 data is output from the Breakout box via the local comms connection, and this is daisy-chained to the local amplifiers. This two-way link allows the amplifiers and Breakout to not only be monitored, but also controlled remotely from the PC connected to another Breakout elsewhere on the network.



Installation system with several remotely located amplifier racks and a local rack directly connected to the PC via RS485.

Examining the system further, it can be seen that each "Remote Location" has its own Breakout box to not only provide the audio signals for the amplifier(s) but to connect via the RS485 "Local" output to the amplifiers.

As this output is a regenerated signal, the maximum cable length is again 1000 metres – total distance end to end, not between adjacent nodes.

In this way, the remote racks can be located as far away as required, as the main length of cable will be an Ethernet cable and this connection can be extended as required through the use of standard network switches.

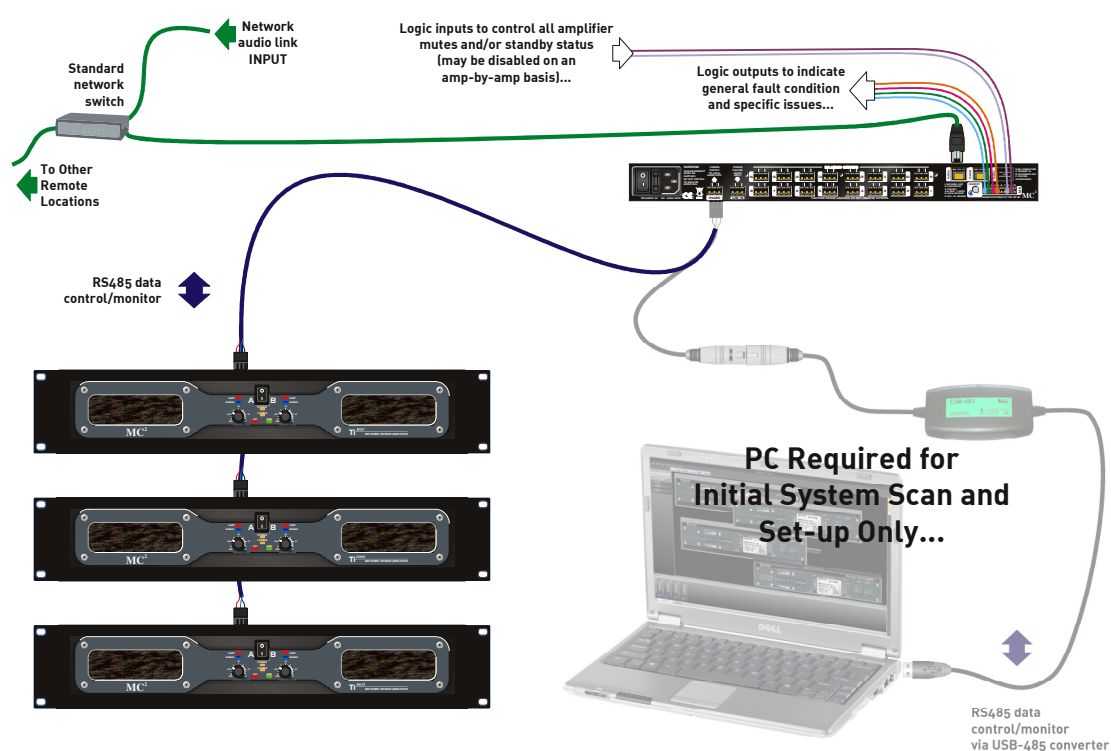
The "Local Amp Rack" is directly connected to the Breakout box, and computer, via the local RS485 output.

## 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".

Up to 128 devices can be monitored by a single Breakout box.



### *Selecting “Pulsed” or “Latched” mode for the Network Master*

Before going off-line and switching the chosen Breakout into “Network Master”, it’s necessary to choose the mode of operation, which affects how the GPI lines respond in the event of an error being detected.

This is achieved by changing the device “GPIO Config.” Network Master Mode property in **iCORE** as required. An explanation of how each mode works is given on page 33.

### *Final preparation for “Network Master”*

The computer can now be disconnected or powered down. Whichever Breakout box has been designated as the “Network Master” will then interrogate every other connected device (amplifiers and other Breakout boxes) 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:

- ✓ General fault indication: This can be programmed to assert for any combination of the possible system fault conditions (see page 32). It is asserted under the chosen fault conditions (the three below).
- ✓ Load error: This will be asserted if any amplifier channel which has load monitoring enabled has a load that has gone out of range.
- ✓ Network error: This will be asserted if any amplifier or Breakout stops responding to interrogation for more than four seconds.
- ✓ Protect error: This will be asserted if any amplifier goes into protect.

Please note these few final points:

- 1) Only one device on the system can be the “Network Master”.
- 2) The system is NOT controllable via **iCORE** when there is a “Network Master”. Attempting to connect at the same time will result in erratic operation and erroneous error reporting!
- 3) If the “Network Master” doesn’t seem to be addressing all the units, make sure it was connected to the system at the same time as all units were scanned in **iCORE**, otherwise its address list may be either incomplete or have units listed that no longer exist. Switch out of Network Master mode, and rescan the system with **iCORE**.
- 4) If Network Errors are reported when all seems fine and all units are being scanned, see point 3 again – if the correct list is not stored in the Network Master then any units that are no longer on the network will still be scanned and so will report as a Network Error. Switch out of Network Master mode, and rescan the system with **iCORE**.
- 5) Remember that changing to “Network Master” can only be achieved after a reboot of the desired Breakout Box.

## The GPI Port

### Overview

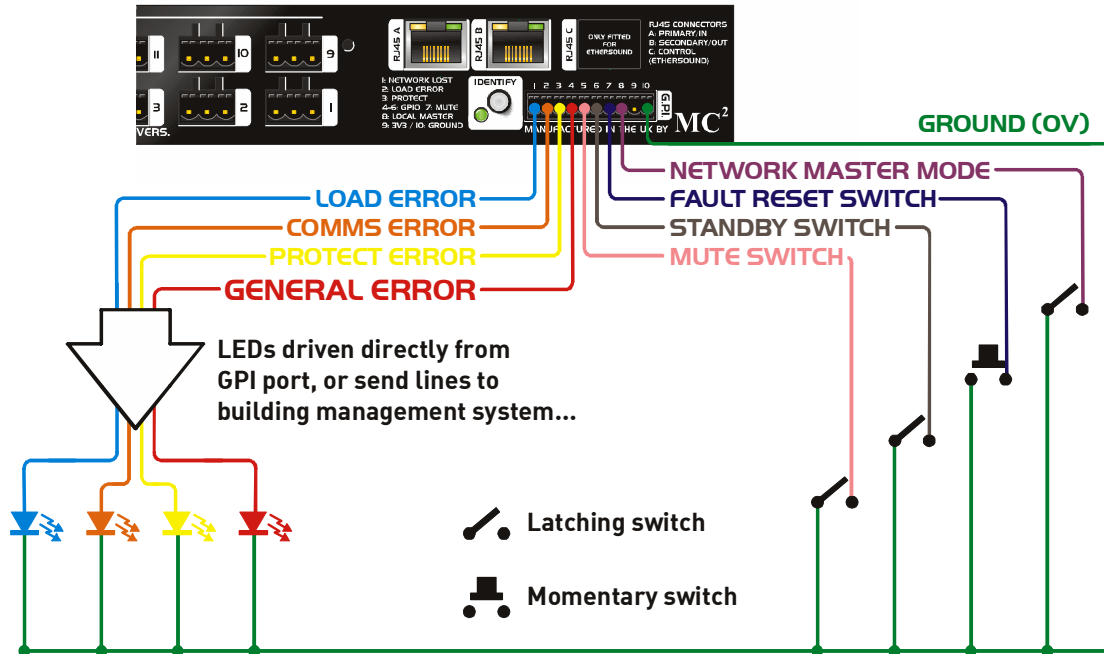
The GPI port on the rear panel of the Breakout box is used to put any one device on the network into "Master Mode" and also provides inputs and outputs used to control and signal the other devices connected.

The pin-out of the port is:

| Pin Number | Description   |
|------------|---|
| 1          | <b>Output</b> – Load Error<br>(0V – off; 3V3 – on)              |
| 2          | <b>Output</b> – Network Error<br>(0V – off; 3V3 – on)           |
| 3          | <b>Output</b> – Protect Error<br>(0V – off; 3V3 – on)           |
| 4          | <b>Output</b> – General Error<br>(0V – off; 3V3 – on)           |
| 5          | <b>Input</b> – Fault Reset<br>(Momentary – to 0V to reset)      |
| 6          | <b>Input</b> – Amps Standby<br>(Latch – to 0V to force standby) |
| 7          | <b>Input</b> – Amps Mute<br>(Latch – to 0V to force mute)       |
| 8          | <b>Input</b> – Network Master<br>(Latch – to 0V to make Master) |
| 9          | <b>Output</b> – 3V3<br>(regulated and protected @ 200mA)        |
| 10         | <b>Output</b> – 0V Ground<br>(common for all I/O lines)         |

### Setting a Breakout box to “Network Master”

The GPI port on the rear panel of the Breakout box is used to put any one device on the network into “Master Mode” and also provides inputs and outputs used to control and signal the other equipment connected to this port.



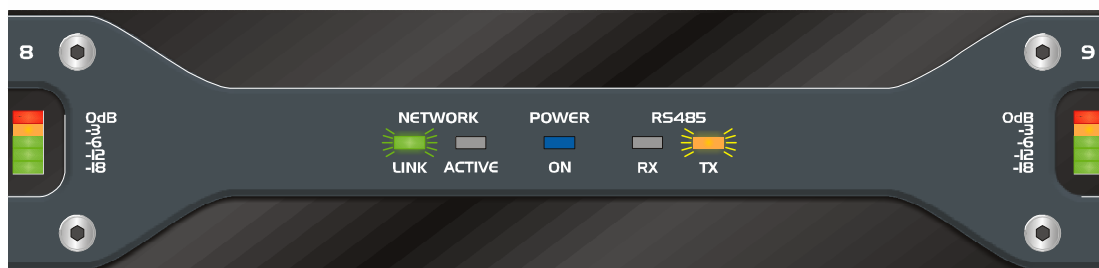
To tell the Breakout to work as “Network Master”, pin 8 of the GPI port needs to be grounded. This can be achieved by connecting it to pin 10 on the same connector. Note that switching to “Network Master” can only be initiated on power-up of the unit – it will NOT switch into (or out of) master mode once running.

Connect pin 8 to pin 10 and reboot the unit.

Verification that the unit is now the “Network Master” is given by a series of flashes on the centre section LEDs as the unit reboots – this also shows the mode of operation as explained overleaf.



### *“Network Master” Pulsed Mode*

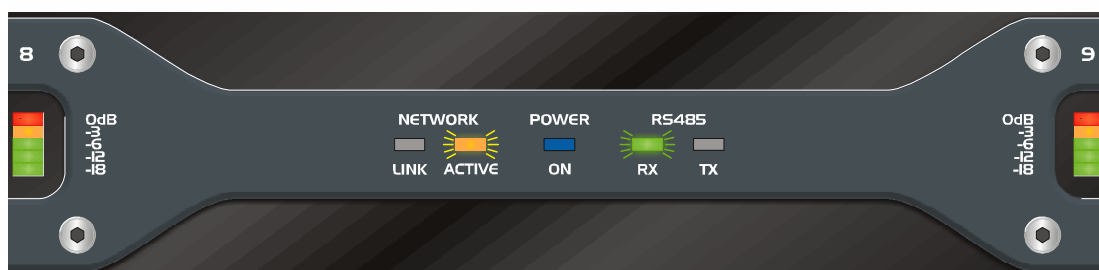


If the Breakout box is powered up as “Network Master” and is in Pulsed Mode, the two outer LEDs will flash 9 times during boot-up.

Operation of the GPI port in this mode is as follows:

The “Pulsed Mode” will illuminate/set the General Error (according to its programmed requirements – see page 26) and flash/pulse the individual error outputs each time the faulty device is addressed. In this way it can be seen if errors are on the same device (lines will flash in unison), and how many errors there are (more flashing is more faults!). If errors clear, the lines will stop flashing, so no user intervention is required - no lights = no faults.

### *“Network Master” Latched Mode*



If the Breakout box is powered up as “Network Master” and is in Latched Mode, the two inner LEDs will flash 9 times during boot-up.

Operation of the GPI port in this mode is as follows:

The “Latched Mode” will flash the General Error at 0.5Hz and the individual error outputs will latch on while the error exists. If errors clear, then the individual lines will go off, but the General Error will stay flashing. A GPI input (pin 6) line has been designated as a reset and grounding this will clear the flashing General Error if required. If reset is pressed and errors still exist, nothing will happen.

For more information on setting swapping the modes between “Latched” and “Pulsed” please see page 26.

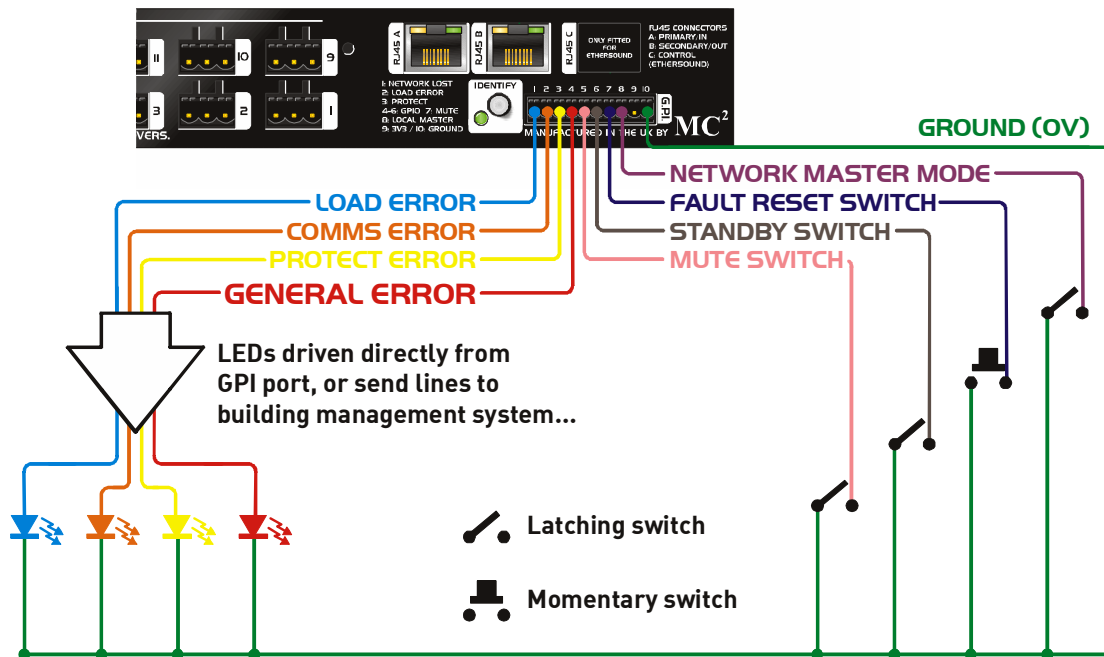
## System Operation in “Network Master” mode

Once the Breakout box has booted up, it will begin sequentially scanning and interrogating all the units stored in its address list. This will be evident by the RS485 RX and TX LEDs starting to flash on the front panel, and each device on the network briefly flashing its COMMS LED (on amplifiers) or its RX/TX LEDs (Breakout boxes) in sequence.

Remember – only one Breakout may be set to “Network Master” on any network, and **iCORE** cannot be used at the same time, unless the unit is either switched off, or switched out of “Network Master” mode (requiring a re-boot).

It’s sometimes quicker just to turn off the “Network Master” if changes to the system through **iCORE** are not involving this unit.

## Additional Functions of the GPI port – Mute and Standby



In addition to the output lines that can be used to drive LEDs or send signals to building management systems, there are also input lines that can be configured to mute all connected amplifiers or force them into standby.

These lines may be disabled on the Breakout by changing the device “GPIO Config.” input property in **iCORE** as required (see page 26).

Their action differs slightly depending on whether the unit is in “Network Master” mode or not. If set to be a “Network Master”, then grounding pin 6/7 will standby/mute all amplifiers on the entire network. If the unit is not a network master then it will only standby/mute amplifiers connected to its local RS485 port. These need to be LATCHING connections to work correctly!

## Switching Between 48kHz and 96kHz

It is possible to run all three currently supported networks at either 48kHz or 96kHz sample rates, the Breakout box can be switched to receive either sample rate.

This is achieved by pressing and holding the Identify button on the rear panel, once the unit has booted up and is passing audio. The power LED will begin to flash along with the rear panel identify LED, but keeping the button held in for about 3 seconds will trigger a swap of sample rate.

This is evident by the audio muting and the power LED briefly extinguishing, followed by either one or two flashes to indicate the new sample rate (48kHz or 96kHz respectively), and the audio fading back up. When complete, the power LED will illuminate again as normal.

Repeated press and hold actions will swap between 48kHz and 96kHz. This sample rate is also remembered on power down. During start-up, the power LED will flash either once or twice to indicate the current sample rate of the box.

Please note: this procedure only affects the Breakout boxes digital to analogue converters' sample rate, and does NOT adjust the sample rate being used on the network.

Please see associated TechNote on our website at [www.xta.co.uk](http://www.xta.co.uk) in the "Tech Support" section for how to upgrade the firmware for your network card.



## Resetting the Breakout box to Factory Defaults

If for any reason you need to set the unit back to its factory default settings, it is performed as part of the start-up procedure using the "Identify" button on the rear panel.

Power the unit up and, after one second, hold in the "Identify" button until the blue power LED illuminates – it will then flash quickly ten (10) times to show the reset is complete. Reboot the unit for all changes to take effect.

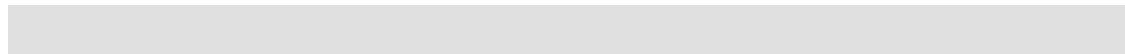
The following settings are returned to default values using this method:

All output channel gains set to 0dB;  
All output mutes set to OFF;  
Sample rate set to 48kHz;

Device Name: "Breakout Network Name Has Not Been Set!";  
Channel Names: 1 = "01", 2 = "02" etc.  
GPIO Config. – Input = Disabled;  
GPIO Config. – Output = Disabled;  
GPIO Config. – Network Master Mode = Pulse;

The network address list used when the unit is in "Network Master" mode will also be erased.

Note that this does NOT reset the networked audio routing or have any effect on the network audio card. Please see documentation for your particular network card for details of how to adjust this.



## Appendix I: Updating Device Firmware

### Overview

The firmware that runs the Breakout box 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 39 for details of this if required.

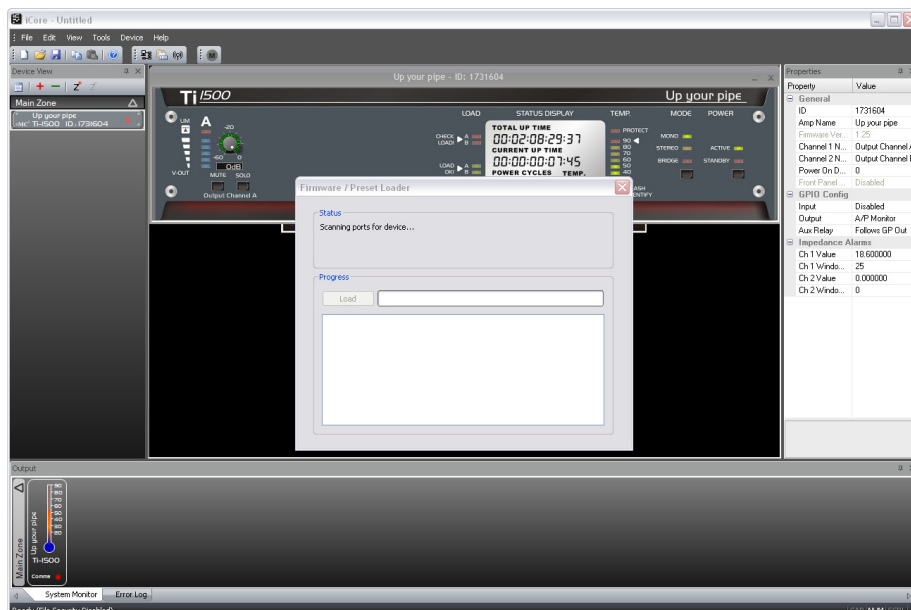
### Update Procedure Using iCORE

Before starting any updates...

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

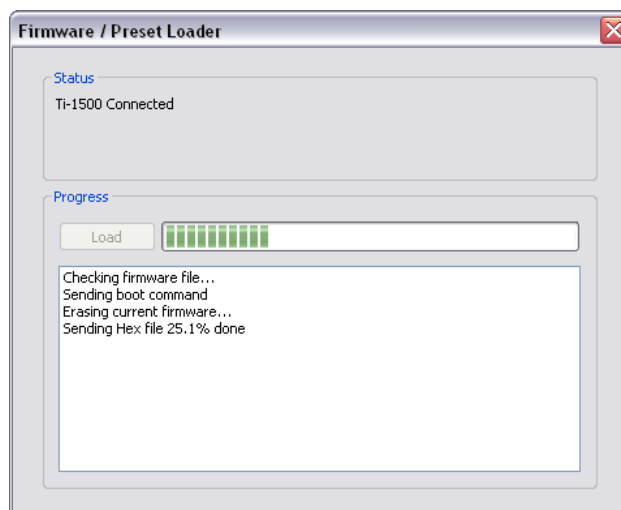
**CLOSE ALL OTHER OPEN PROGRAMS ON YOUR COMPUTER!**

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



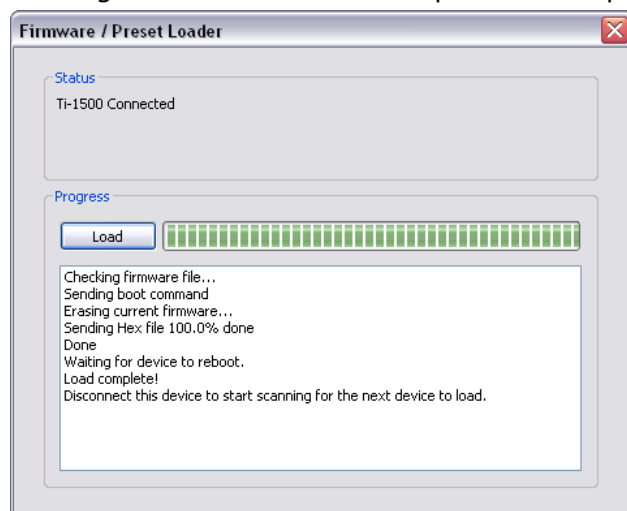
The loader will start scanning for all connected devices to determine what unit it has to update. After a few seconds the device will be found and identified (its Power LED will begin to flash). Check the model number, which will be shown in the status pane and if OK, press the "Load" button.

The Breakout will mute and power down immediately and the update will start.



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

During the update the RX and TX Comms LED will flicker. The update takes less than 90 seconds and when complete, the Breakout 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. 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 another Breakout box over the Ethernet connection) and must be directly connected to the local RS485 network from the computer.

## Recovery Update Procedure

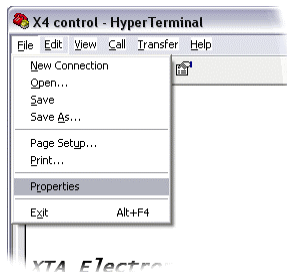
If there was a problem during the update procedure, or **icore** is not available, it is possible to update the Breakout box in “boot-load” mode using a basic terminal program, provided a copy of the firmware is available.

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

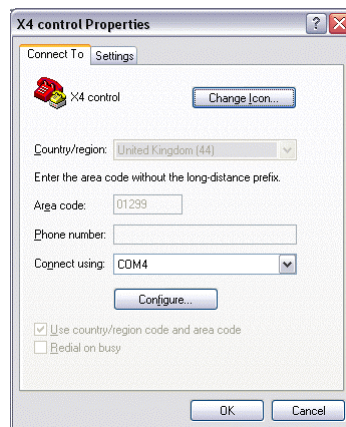
**start** ⇒ All Programs ⇒ Accessories ⇒ Communications ⇒ HyperTerminal

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:

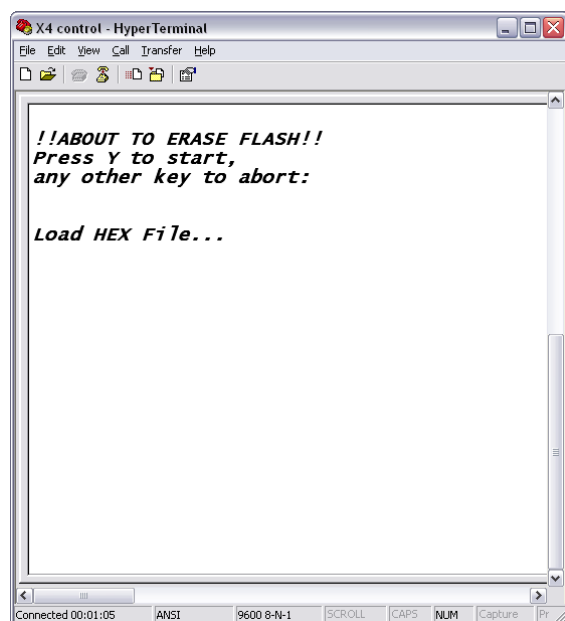
**9600 Baud, 1 Stop Bit, No Parity**

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

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

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

To force the Breakout box into “boot-load” mode, press the “Identify” button on the rear panel and hold it in whilst turning the unit on. The POWER LED will illuminate immediately. Release the button. A message should appear in the HyperTerminal window:

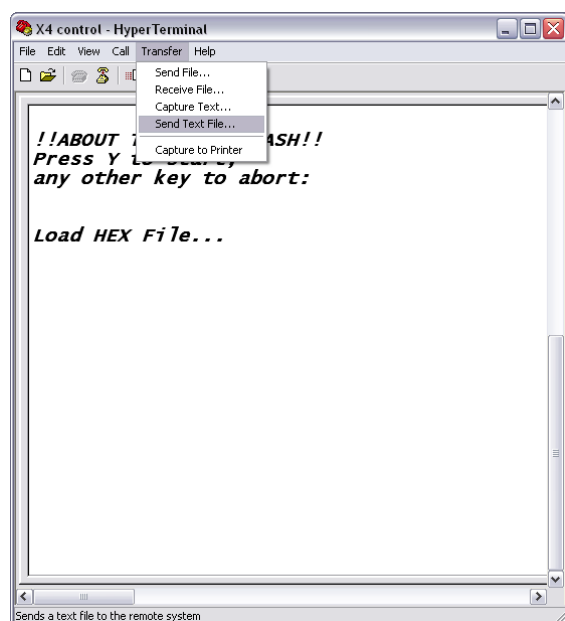


Pressing “Y” on the keyboard will then erase the current firmware and prompt for a new version to be loaded.

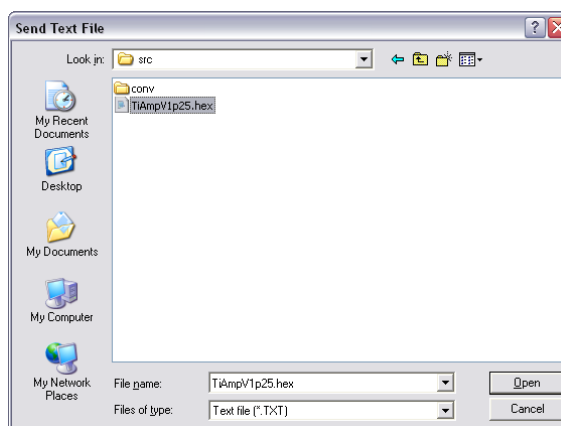
**If you want to cancel this before the erase procedure, just press any another key or turn the unit off.**

Otherwise, press “Y” – the RX LED will illuminate 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

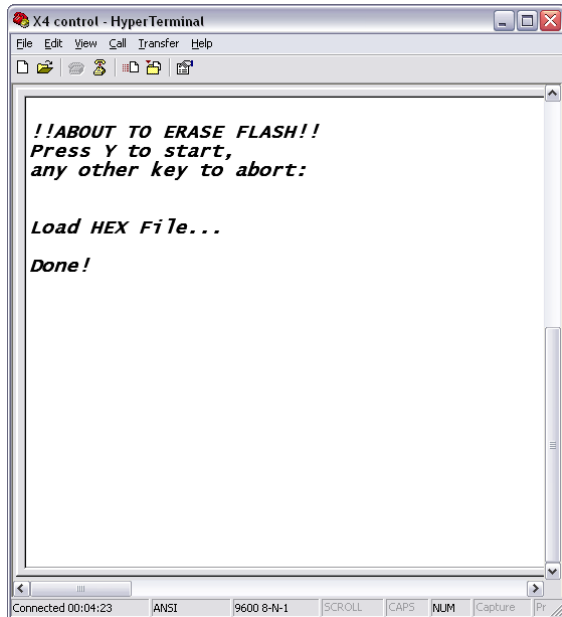


location of the amplifier firmware file. The file type by default on the file select window is “txt” – change this to “hex” to ensure the firmware can be located.





Pressing "Open" when the file has been located will start the load procedure immediately. The RX and TX LEDs on the unit will begin to flash quickly. The load will take under 90 seconds. When complete the HyperTerminal window will show



and pressing any key will reboot the unit.

You may keep the window open and repeat the procedure for any other connected Breakouts – 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 II: Maintenance

The Breakout box will require little in the way of routine maintenance, apart from occasional routine checking of the fan outlets on the side panel.

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

## Appendix III: Specifications

### Connections:

Audio out: 8/16 x XLR or Phoenix  
RS485 Comms Network I/O: 1 x XLR or Phoenix  
GPI Port: 10 way mini-Phoenix  
Network Audio Transport: 2 or 3 RJ45 (Ethernet)

### Metering:

0dB LED threshold: +19dBu  
Metering tolerance:  $\pm 1.5$ dB

### GPIO Port:

Inputs – 5V maximum (3V3 nominal)  
Outputs – 3V3, 20mA  
3V3 Output – 200mA max drain

### Audio performance:

Sample Rate: 48kHz/96kHz (Dante only)  
Maximum Output Level: +21.5dBu  
Frequency Response: 20Hz–22kHz  $\pm 0.5$ dB  
Dynamic Range: > 112dB (Unweighted, 20Hz–20kHz)

### Power supply requirements:

Voltage: 90-260V AC  
Power consumption < 30W  
Fuse rating: 1A

### Dimensions:

482 x 428 x 88mm (WxDxH)

### Weight:

Net weight: 3.5kg  
Shipping weight: 5kg

MC<sup>2</sup> Audio reserve the right to change and improve the specifications without notice.

# Index

## **B**

Breakout Box Monitor ..... 32

## **C**

Check COM Port ..... 17

## **D**

Default Settings .....13, 39

## **F**

Factory Reset..... 39  
 Firmware Recovery ..... 43  
 Firmware Update  
     Using HyperTerminal ..... 43  
     Using iCore ..... 40  
 Front Panel  
     Level Meters ..... 10  
     Network Badge ..... 10  
     Network LEDs..... 10  
     Power LED ..... 10  
     RX and TX LEDs..... 10

## **G**

Global Mute Pin ..... 37  
 Global Standby Pin ..... 37  
 Going On-line..... 17  
 GPI  
     Mute Switch ..... 37  
     Standby Switch ..... 37  
 GPI Port  
     Network Master ..... 35  
     Pinout ..... 34  
 GPIO Configuration ..... 29  
 GPIO Inputs..... 29  
 GPIO Outputs..... 29

## **I**

iCore  
     Auto-hiding Windows.....26  
     Breakout Properties.....29  
     Front Panels .....28  
     Main Window .....21  
     Moving Windows .....24  
     Set COM port.....19  
     Zoning Devices .....27  
 Initial Setup .....13  
 Installation  
     Electrical.....8  
     Mechanical .....8

## **K**

KK Systems ..... 14

## **M**

Mains Wiring Colours.....5  
 Maintenance.....46  
 Master Mode ..... 32  
 Master Mode Configuration.....29  
 Meter scaling..... 13

## **N**

Network Master ..... 32  
     Latched Mode .....36  
     Pulsed Mode .....36  
     Swapping Mode .....33

## **R**

Rear Panel  
     Audio Outputs.....11  
     GPI Port.....12  
     Identify Switch .....12  
     Network Card Connections .....12  
     Power Fail Audio Input .....11  
     RS485 Phoenix .....11  
     RS485 XLR .....11  
 Remote Control .....14  
     Comms Bridge .....29  
 Restore Defaults .....39  
 RS485  
     Connections .....16  
     Extending range.....31  
     Maximum distance .....16  
     Maximum drops .....16

---

**S**

|                               |    |
|-------------------------------|----|
| Safety Information .....      | 5  |
| Set Sample Rate .....         | 38 |
| Specifications.....           | 46 |
| Swap Between 48k and 96k..... | 38 |

---

**U**

|                     |    |
|---------------------|----|
| Unpacking .....     |    |
| Update Failure..... | 43 |

|                             |    |
|-----------------------------|----|
| Update Firmware .....       | 40 |
| USB to RS485 Converter..... | 14 |
| USB-485 wiring .....        | 15 |

---

**W**

|                                 |    |
|---------------------------------|----|
| Windows System Properties ..... | 17 |
|---------------------------------|----|