CODA
CODA AUDIO

Operation Manual
- LINUS Control v2.1.18 –

1. General

The LINUS Control software provides a reliable and ruggedized application for the control and monitoring of the Coda LINUS amplification platform. It is optimised for both Mac OSX and Windows, for both tablet and native interfaces. Bundled in the application behind the scenes is the device Firmware, Speaker Files, Control Logic and a 3rd Party UDP Control protocol that will allow for offline remote control of LINUS amplifiers from 3rd Party Devices, very useful in installation scenarios.

1.1. Network

LINUS Amplifiers communicate using TCP & UDP on an Ethernet Network. The devices can be controlled by a MacOS or MS Windows Personal Computer using the LINUS Control application. Control data, Firmware & Speaker Files all travel on this Ethernet Network. It is currently possible to control up to 250 LINUS devices on one physical Network.

Each LINUS Device needs a unique ID number (the number in the top-right of its Front Panel LCD). With duplicate IDs on the Network, performance of the whole network will be hampered & correct operation cannot be guaranteed. If multiple duplicate ID's have recently existed on a network but have since been corrected, as with most IP based systems, it may in some circumstances prove necessary to reboot the network switching & routing hardware, or wait an undetermined time for the switching fabric to update its internal MAC Address -> IP Table.

Whilst the individual devices are fitted with 100Mb/s interfaces, larger networks will benefit greatly from Gigabit networking infrastructure, especially the interface of the LINUS Control computer. The network should be built with CAT5e U/FTP Cable with a maximum length of 100m. For lengths over 100m, Network Switches with Fibre links should be utilised.

Note – The length limit of 100m is normally only achievable with new, undamaged cable. The maximum achievable length of an Ethernet link may be significantly reduced below 100m if the cable is damaged / crushed / kinked / poor quality.

For optimum performance, ensure all LINUS ID's are unique on the network prior to connecting network infrastructure. A star network topology should be used where practical. It is however generally possible to link (daisy-chain) up to 6 devices on a node. Further daisy-chaining may be possible but should be tested to ensure reliable communication for the specific deployment. The Dante ports on the LINUS14D should (in most cases) be connected to a 'distributed star' topology network. Careful attention should be paid to ensure the minimum number of 'switch hops' between the transmitter & receivers, or the latency setting will need to be increased appropriately to guarantee network stability.

1.2. Amplifier ID Numbers & IP Schema

Amplifiers have an addressable ID number in the top-right of the Front Panel LCD Display. This number can only be adjusted when LINUS Control is offline, or the amplifier is disconnected from the network.

Note – The ID number represents the final octet of the IP address in the subnet 192.168.1.X.

For example, an amplifier with ID Number #42 would have IP Address 192.168.1.42.

The control computer does not need a specific IP Address to communicate with the amplifiers, it only needs to have a unique IP Address in the 192.168.1.X subnet.

Note – Purely as a suggestion, we would recommend setting the LINUS Control computer to: 192.168.1.251 / 255.255.0.0. The subnet mask 255.255.0.0 is only required during the Firmware upload process, as the amplifiers briefly switch to 192.168.10.10 during the firmware update process. Once firmware is updated, it is fine to switch back to a more appropriate subnet mask.

1.3. Upgrading Firmware

LINUS Control contains internal logic to update the amplifiers firmware and speaker library safely to the correct firmware. Please see the accompanying document "LINUS Update Procedure" to find the correct procedure for upgrading and downgrading Firmware.

Note – Failure to upgrade the firmware as described within the accompanying document "LINUS Update Procedure" will result in amplifiers that are in an indeterminate state and will not be reachable by LINUS Control. In this case, they will need to be placed within Hardware Update mode, and the process restarted as prescribed in the document.

1.4. Downgrading Firmware

To downgrade the LINUS Amplifiers to the v1.2.X stream, the user should consult the accompanying document "LINUS Update Procedure".

1.5. Multiple Clients

It is not possible to run multiple instances of LINUS Control on one host, or on the same control network. It is however possible to run an instance of Google Chrome on another computer, tablet or iPad for instance, and allow it to control the LINUS Control backend server. To do this follow these steps:

- Install / Run Google Chrome on the secondary device

- Navigate in the web browser to the IP address of the LINUS Control host machine, followed by a colon, then 8111 – (this is the control port).
- You will then be presented with a native LINUS Control interface.
- This will mitigate the need for use of things such as VNC clients.

- *In this example, 192.168.1.250 would be the IP address of the host machine.*

2. LINUS Control Application

The LINUS Control application is divided into three key areas; the top toolbar, the workspace and the bottom toolbar. The top toolbar and bottom toolbar persist through all the views, and the workspace changes depending on which mode LINUS Control operates.

2.1. Top Toolbar

The top toolbar contains the top-level operating modes of LINUS Control, a dropdown list for choosing the amplifier detail views, a master mute button, the Fallback Recovery button & the control for taking LINUS Control Online & Offline.

2.2. Top Toolbar Modes

The active mode is highlighted in RED. Keyboard shortcuts are mapped as below:

Modes	Keyboard Shortcut	
SETUP	S	Provides methods for configuring the system
AMPS	A	Amplifier status, plus control of snapshots on a global level
TUNE	T	Methods for controlling the system
MONITOR	M	Methods for monitoring the system

2.3. Top Toolbar Fallback Controls - Recover Digital

This button is visible if one or more amplifiers in the workspace is running on their backup signal. This would happen under one of two circumstances:

- Their digital signal has been lost
  -or-
- The 'Force Fallback' button was pressed

In either of these circumstances, the 'Recover Digital' button will be presented. Pressing the button will command all connected amplifiers in the workspace to return to their primary digital signal. If all amplifiers in the workspace successfully returned to their primary digital signal, this button will then be hidden.

2.4. Top Toolbar - Dropdown Detail View

This dropdown menu provides functionality for switching through the different view states of the Amplifier Icons. Its entities are mapped to keyboard shortcuts ['1' through '8'].

2.4.1.   Amplifier Type

The type of amplifier is displayed in the amplifier icons.
This has implications for the creation of the show file, key differences crucial for preset compatibility are detailed in the table below:

Amplifier Type	Sensor	Dante	LiNET Chans
LINUS14	YES	Optional	8
LINUS10	YES	No	8

LINUS10-C	NO	No	4
LINUS5-C	NO	No	4
LINUS CON	ALLOWED	No	8

Please see the accompanying document "LINUS Control Speaker File List" to determine speaker compatibility.

2.4.2. ID / IP

The ID number of the amplifier is displayed (as with all other detail views) in the left side of the icon. The IP Address for this amplifier is shown in the central area of the icon.

2.4.3. Amplifier Name

This is a 'friendly name' that can be given to each amplifier in the workspace. It is a standalone entry that does not refer to anything else. Click the name and enter text to edit the name.

2.4.4. Speaker

This view shows which speakers are assigned to each channel. The top line displays a short name of the type of speaker & the bottom line shows the type of the output channel.

Speaker Type	**Short Name**
AiRAY	AiR
ViRAY	ViR
TiRAY	TiR
APS	APS
HOPS 8	HP8
HOPS 5	HP5

Output Channel	**Suffix**
Sub	SF
Low	LF
Mid	MF
High	HF
Passive	PF
Front Facing Cardioid	FF
Rear Facing Cardioid	RF

2.4.5. Inputs

The channel input sources are shown on a per-channel basis. The Input Level meters are drawn on a per channel basis.

Prefixes:

- A / B / C / D   = Analog Inputs
- 1 / 2 / 3 / 4 .. 8   = LiNET Inputs
- D1 / D2 / D3 / D4   = Dante Inputs

Suffixes:

- -   (negative sign)   = Polarity Inverted
- !   (exclamation mark)   = Mixture of Inputs

The meters show the input signal level on a per-channel basis for the input assigned to that channel.

- Input meters start at -60dBFS.
- When the peak level exceeds -10dBFS, the meter will turn yellow.
- When the peak level exceeds -3dBFS, the meter will turn red.

2.4.6.   Mutes & Outputs

For each channel, there is a combined mute button & output level indicator. If the mute is active on the channel, the indicator turns solid red. If the mute is inactive, the background of the channel is light grey.

Channels   Channels
muted   unmuted
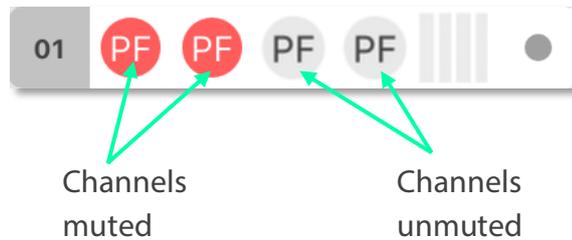
When the channel mutes are off, output meters are displayed in green behind the suffix. The output meters are calibrated in dB relative to the speakers full RMS output potential on a per-channel basis.

- Output meters start at -45dB (rel)
- Output meters are full-scale at 0dB (rel)

To the right of each amplifier icon, a gain reduction meter is drawn. This shows gain reduction on a per-channel basis.

- Gain Reduction meters start when there is -1dB of Gain reduction
- Gain Reduction meters are full-scale at -6dB GR
- Gain Reduction meters are red when there is -6dB GR or more

2.4.7.   Gain

For each channel, the combined sum of all the group gains is displayed.

01	0.8	5.8	-7.3	11.3		●
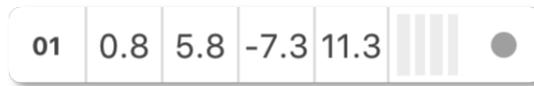
2.4.8.   Delay

For each channel, the combined sum of all the group delays is displayed.

01	0.8	4.6	4.6	10.4	●
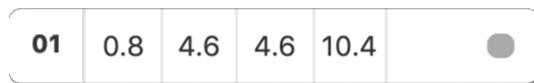
2.5. Top Toolbar - Master Mute

This button toggles the mute state of all connected & online amplifiers on the network. Red is muted, grey is unmuted.

2.6. Top Toolbar - Online / Offline

This button toggles the software Online & Offline.

3. Bottom Toolbar

The Bottom Toolbar contains tools relevant to the LINUS Control window & the extra functionality of amplifier identification.

3.1. Bottom Toolbar – Lock

The Padlock icon in the Bottom Toolbar is displayed when the operation mode is changed to "MONITOR" in the Top Toolbar. When pressed, it will turn red/orange and all interface controls will be locked to prevent inadvertent keyboard or mouse inputs during the show.

Interface Unlocked   Interface Locked
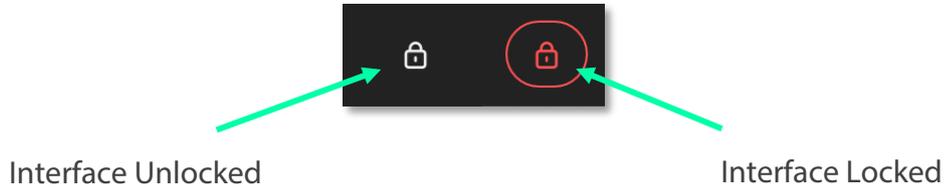
3.2. Bottom Toolbar – Identify

Click 'Identify' to flash the LED's on the amplifiers that are selected on the workspace.
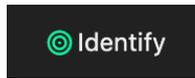
3.3. Bottom Toolbar - Night Mode / Day Mode

The button in the centre of the Bottom Toolbar toggles the interface between night & day mode.
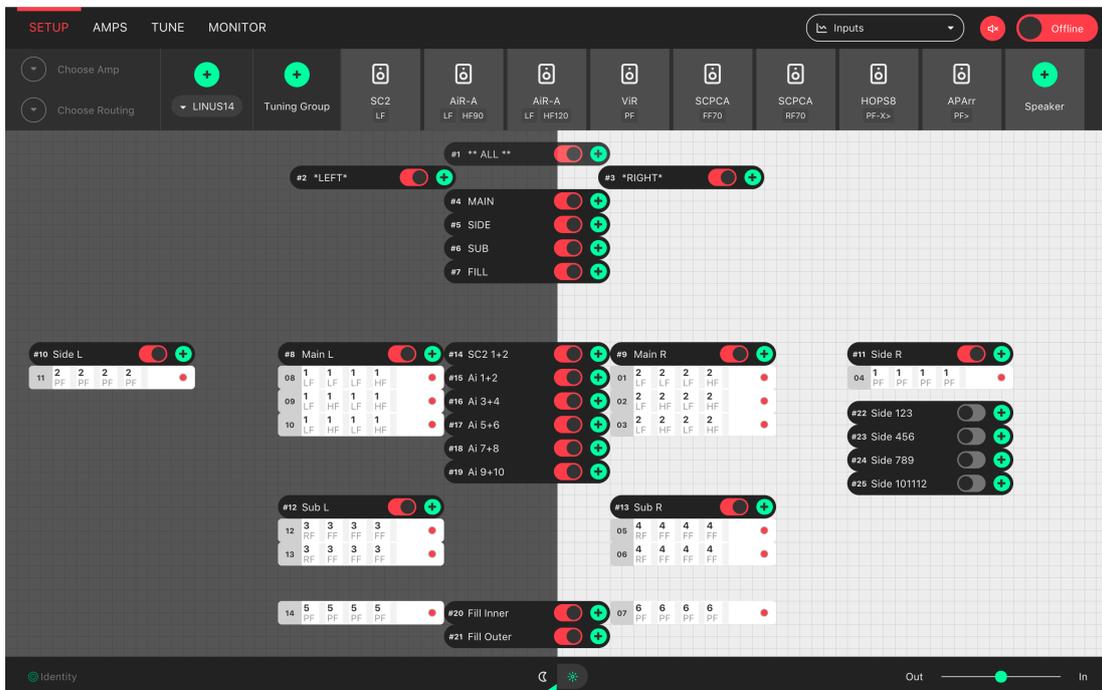
Night Mode / Day Mode

3.4. Bottom Toolbar - Zoom

The slider in bottom right side of the Bottom Toolbar scales the workspace and its contents. This allows for the optimum display size on different resolution screens from small systems to large ones.

3.5. Bottom Toolbar – 'Attention Getter'

The background of the Bottom Toolbar is black by default. In the event of a warning or an error, it will change its background colour accordingly. This serves to quickly get the attention of the user in a subtle way. Clicking the background of the Bottom Toolbar will navigate to the AMPS view, where the warning or error status of the amplifier(s) can be seen.

Note – A Warning is an abnormal condition which exists that has not resulted in the loss of audio. If left unchecked, an error condition could develop. Example – an amplifier is reporting an abnormally high temperature because its vents are inadvertently choked by waterproofing materials at an outdoor event.

In the case of a Warning, the Bottom Toolbar background will be Orange in colour.

Note – An Errors is a situation that has resulted in a loss of audio. Immediate action is required to regain audio. An example would be an amplifier that has lost mains power.

In the case of an Error, the Bottom Toolbar background will be Red in colour.

4. Setup Mode

The setup page is the start point for the design of the workspace. Here it is possible to Add Amplifiers & Groups to the workspace, choose input routing, assign groups and arrange the system in a logical manner.

Key Concepts:

- Amplifiers are displayed with the following icon style:

- Tuning Groups are displayed with the following icon style:
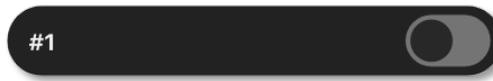
- Speakers are assigned to Amplifier Channels.
- Amplifier Channels are assigned to Tuning Groups.
- Tuning Group parameters are adjusted on the TUNE page.

4.1. Setup Mode - Top Toolbar

In Setup mode, an extra toolbar is visible underneath the Top Toolbar. Extra setup-specific controls are displayed here, which are not necessary in the Tune or Monitor modes.
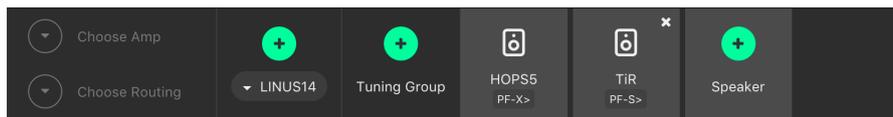
4.2. Setup Mode - Add Amplifier

Pressing the plus icon will add a new amplifier of the selected type into the workspace. It will be given the next logical ID (next free ID number, numerically ascending). The type of amplifier can be chosen by pressing the bottom half of the icon and choosing from the list.
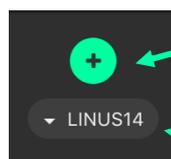

Press here to add the chosen amplifier to the workspace

*Press here to choose a different type of*

4.3. Setup Mode - Delete Amplifier / Group

Pressing the 'X' icon will remove all selected Amplifiers and Groups from the workspace.
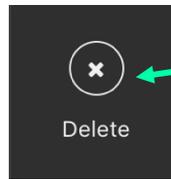
*Press here to delete any items that are selected on the workspace.*

A confirmation dialog is presented to confirm this action:
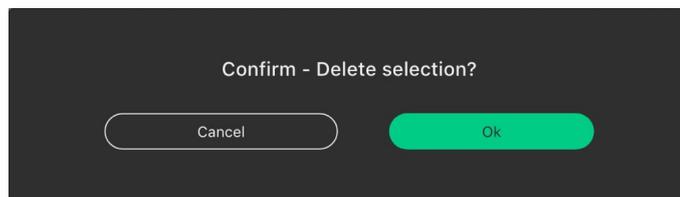
4.4. Setup Mode – Choose Speakers

When a new file is created and an Amplifier is added to the workspace, a speaker file is added to the speaker banner. Additional speakers can be added to the banner by pressing the "+" button. This speaker file has two areas:

The top half of the icon is the 'ASSIGN' button.

The bottom half of the icon displays the dropdown list where the speaker can be chosen.
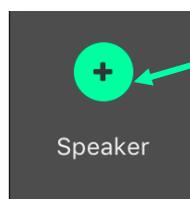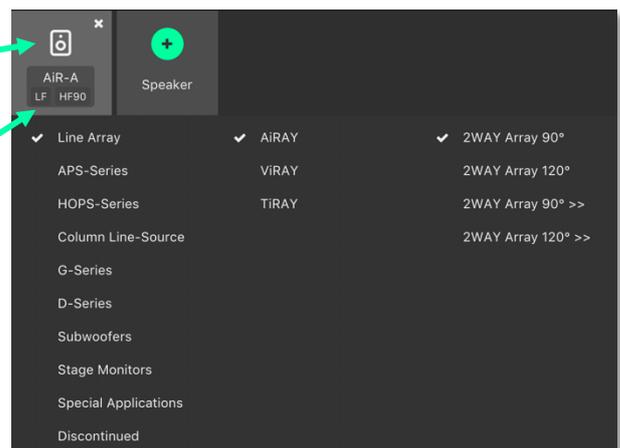
Pressing this button adds a new speaker to the Speakers Banner.
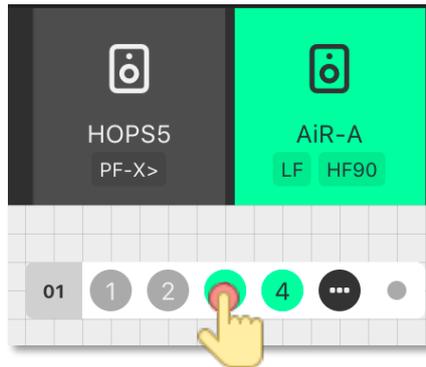
When the speaker is in 'ASSIGN' mode, the channels can be selected that the speaker should be assigned to.

4.5. Setup Mode – Lasso Assign Speakers to Channels

When the speaker is in 'Assign' mode, it is possible to click and drag a bounding box to assign the channels quickly to multiple channels:
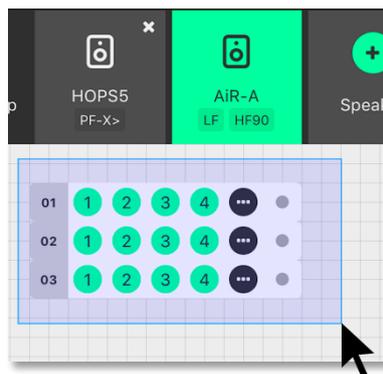
4.6. Setup Mode – Remove Speakers from Speakers Bar

When a speaker is not assigned to any amplifier in the workspace, a small cross is displayed in the upper right of the icon. Clicking this will remove it from the speakers bar:


Pressing this button removes the entity from the Speakers Banner.

4.7. Setup Mode – Add Tuning Group

Pressing this button will add a new Tuning Group to the workspace.

Note - If the user clicks the Add Tuning Group button, then immediately start typing the desired name of the group, before pressing 'Enter', the Tuning Group will accept this text as its name.
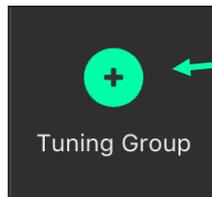
Press here to add a new Tuning Group to the workspace

4.8. Setup Mode - Name Tuning Group

Single clicking the group selects it. Double clicking the group enables the name to be changed. Press enter on the keyboard to accept the name.
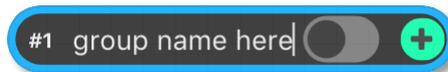
4.9. Setup Mode - Assign Speakers to a Group

Clicking the green 'Plus' Arrow ➕ on the group places it into 'Assign' mode.
The Group's background colour changes to green to indicate this.
Click the Speakers to assign them to the Group.
Click the ⬤ button to assign all the Speakers / Amp Channels into the Group.
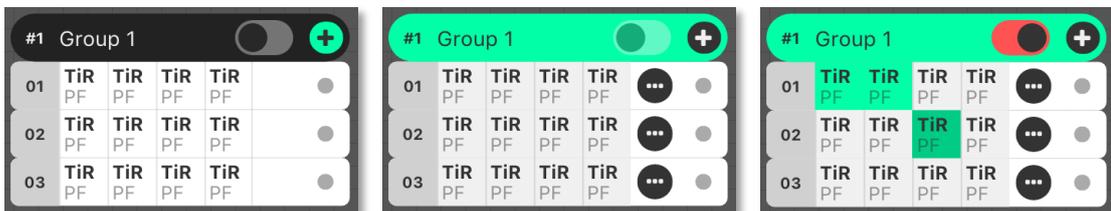
4.10.   Setup Mode – Lasso Assign Speakers to a Group

When the group is in 'Assign' mode, it is possible to click and drag a blue bounding box to add speakers into that group. Pressing 'Shift' and clicking the bounding box will remove the chosen speakers from that group (the bounding box will be red in this case):

Click — *Shift-click*
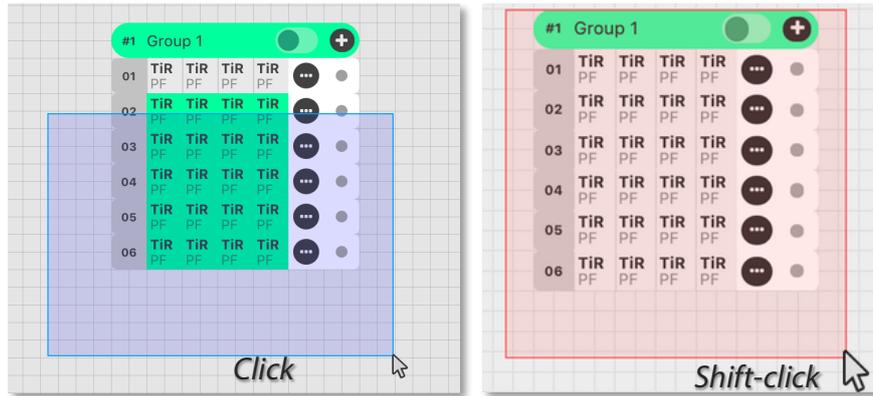
Note   - A new feature within LINUS Control v2.1.18 compared to existing versions is the ability to add amplifiers to a group automatically when the group is added to the workspace. To do this, first select the amplifiers you wish the group to be in control of, then add the group to the workspace.

4.11.   Setup Mode – Change Amplifier

It is possible to change the type of Amplifier in the offline workspace. Select the Amplifiers in the workspace, either with the multiselect lasso or by individually clicking, then click the "Choose Amp" dropdown in the toolbar.
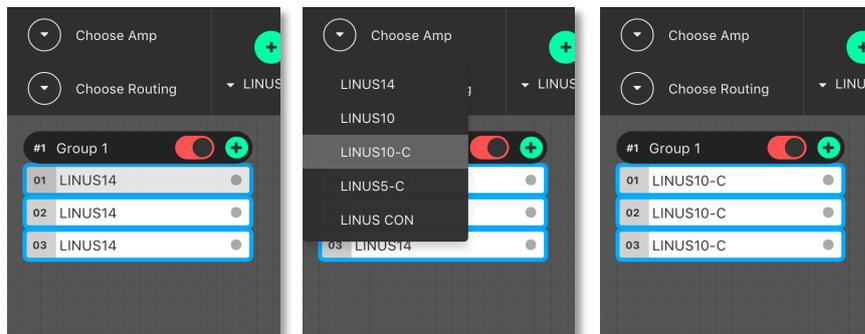
4.12.   Setup Mode – Replace Amplifier ID

It is possible to change the ID of an amplifier in the workspace when Offline. In Setup mode, double click the ID number of the amplifier in the workspace. The following dialog will be presented:
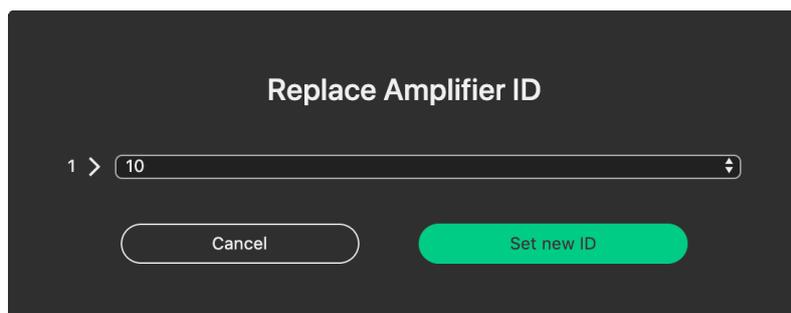
4.13.   Setup Mode - Set Routing

It is possible to adjust the input routing of one or more amplifiers at the same time.

Note – There are couple of variables that affect the routing possibilities; namely Amplifier Type and Speaker Choice. If more than one Amplifier is selected & this selection comprises different Speaker types and/or Amplifier types, the lowest common denominator of routing possibilities will be presented in the Routing Window. For instance, if two LINUS14's are selected, with AiRAY (a 2-WAY enclosure) selected on the first and SCP (a 1-WAY enclosure) on the second, the Routing Window would only allow for patching Channels 1+2 and Channels 3+4 as a 2-WAY pair, even for the Amplifier with the SCP assigned.

Select the Amplifier(s)
Click the "Choose Routing" button
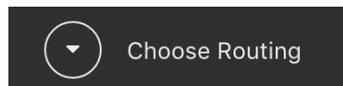
Choose "Analog" or "Digital"
- Input signals are represented in the vertical columns
- Outputs are the horizontal rows
- Click the 'Ticks' to patch the Inputs to the Outputs
- The Output Polarity buttons are the toggle switches to the right of the Outputs
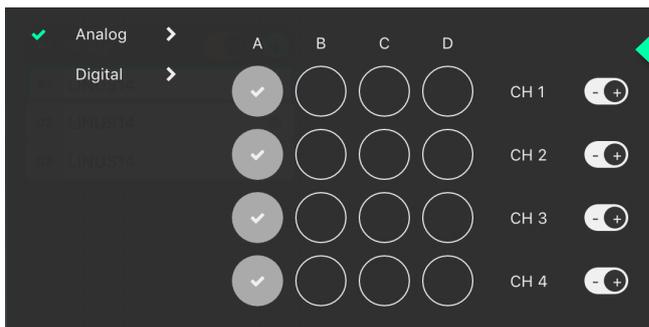
Analog CH A is routed to all outputs. All the outputs are in Polarity.
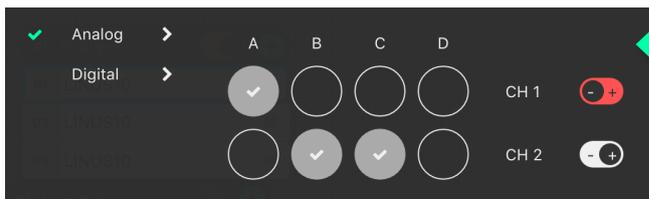
Analog i/p A is routed to o/p CH 1. Analog i/p B & C are routed to o/p CH 2. Output CH 1 is out of Polarity.

LiNET i/p 1 is routed to all o/p Chans.
Fallback is OFF
All o/p's are in Polarity
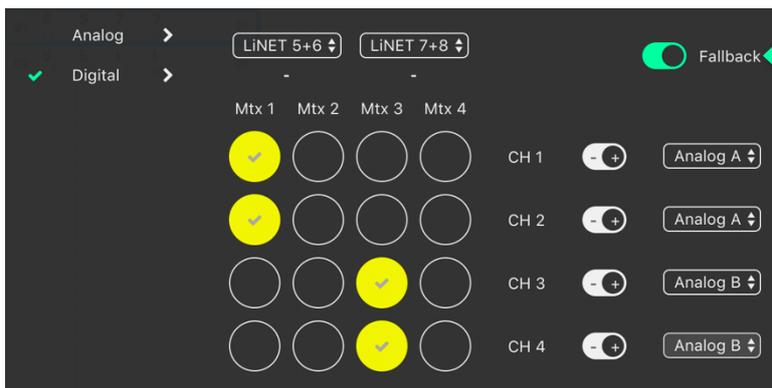
LiNET i/p 5 is routed to o/p CH 1 + 2
LiNET i/p 7 is routed to o/p CH 3 + 4
Fallback is ON.
Analog A is the Fallback source for CH 1+2
Analog B is the Fallback source for CH 3+4

Dante i/p 1 is routed to o/p CH 1
Dante i/p 2 is routed to o/p CH 2
Dante i/p 3 is routed to o/p CH 3
Dante i/p 4 is routed to o/p CH 4

Note – The Dante patch is fixed one to one in the Firmware.
    To adjust the routing of the Dante, please use Audinate's Dante Controller.

To patch the entire row vertically, hold shift whilst clicking one of the patching cross-points.

5. AMPS Page

The AMPS Page gives a fast overview of the status of all connected amplifiers in the system. It also provides the interface for the Snapshot functionality which is discussed in Section 5.4.

5.1. AMPS Page - List of Amplifiers

Arranged numerically by ID number, the Amplifier List is central to the AMPS Page.
On the left, after the ID Number is the Amplifier Type.
The Speakers assigned to the channels are next represented by blue icons.
There is an Amplifier specific 'Store Snapshot' button in each row.

5.2. AMPS Mode - Online Status

If the amplifier is Online, a green indicator is present here.

5.3. AMPS Mode – Errors

As discussed briefly in Section 3.5, there are several errors and warnings that are reported by the Amplifiers. These are announced in this row.

- Error conditions (possible loss in audio) are reported with a red indication.
- Warning conditions (potential to lead to a loss in audio) are reported with an orange indication.

In this example below, an amplifier has lost incoming Mains power. It is announced both in the error row for the amplifier in question, but also in the Bottom Toolbar:

To acknowledge either condition (Error or Warning), click the "Power Loss" announcement. This changes the colour to grey & changes the Bottom Toolbar to its default black colour. When the fault clears, the "Power Loss" announcement will disappear.
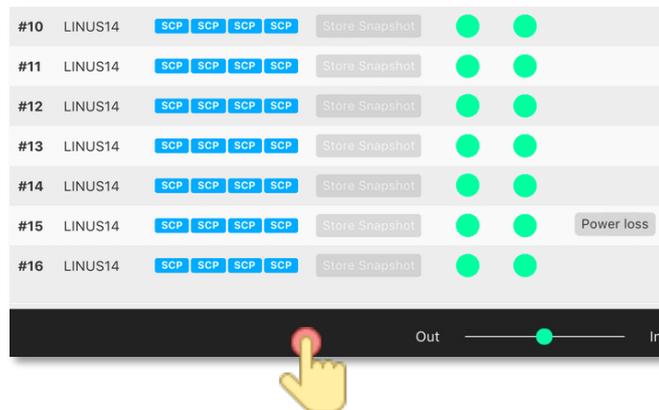
5.4. Snapshots

Snapshots can be thought as a way of storing the absolute state of an amplifier at an exact point in time. Absolutely all parameters are stored, apart from the ID of the Amplifier & the contents of the other Snapshots. Snapshots can either be recalled from the Front Panel, or from the 3rd Party UDP Commands which are detailed in the accompanying document "LINUS Third Party Control".

Note – There is a fundamental difference in operation between LINUS Live v1.X and LINUS Control v2.X in that there are no 'Presets' stored within the Amplifiers, only the 20x Snapshots & the 'Live State' of the Amplifier as commanded by LINUS Control.

Note – Snapshots cannot be stored or overwritten from the Front Panel on LINUS5-C and LINUS10-C Amplifiers. On LINUS14 / LINUS10 & LINUS CON, Snapshot locations 1 through 10 inclusively have read-write access from the Front Panel. Snapshot locations 11 through 20 inclusively are read only from the Front Panel & can only be stored or overwritten from LINUS Control.

Example Usage
Scenario A). (Semi)-Permanent Installation –
The Sound Designer commissions the system and saves a LINUS Control Show File. (S)he also creates a couple of other deployments of the same system, when the 'venue' is utilised for different roles, again, creating show files for these.

I.E:

- There is a main system with delays, all time aligned and tuned to cover one big room

-and-

- It is also possible to compartmentalise the same large room into smaller rooms, whereby the delays are rotated around to act as the main system for the smaller 'satellite' rooms.

In this instance, when (s)he is happy with the tuning of the system for the larger room, (s)he will press the "Store Global Snapshot" button on the top right of the AMPS Page.

A window will then pop up, whereby the Snapshot Location will be chosen, together with a suitable name for the Snapshot. This Snapshot Location is used together with the Snapshot Name to identify it to the user on the Front Panel. It is also used as a reference for recall using the 3rd Party UDP Control Protocol, which can be commanded from most network devices that can transmit custom UDP Messages, for example Crestron™ Remotes.
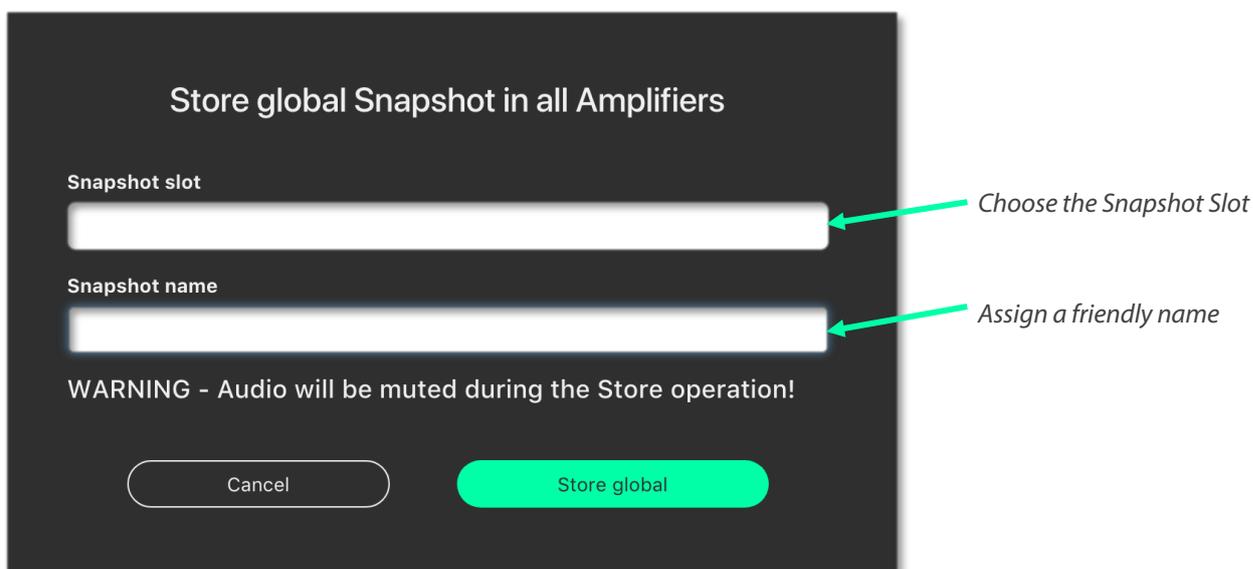
Note - The software will report [mixed snapshots] in the 'Snapshot slot' list if snapshots with different names are stored in the same slot in multiple amplifiers.

Note – As the popup states, when the Snapshots are Stored, Audio will be muted temporarily as the memory is accessed. It is important not to Store Snapshots during a show!

When the Store operation is complete the following message will be displayed in the lower right-hand side of the LINUS Control Workspace:

✔ Successfully stored global snapshot
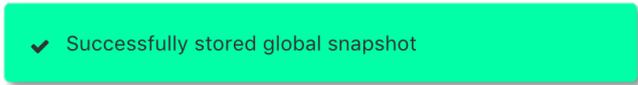
If the user then changes Tuning Parameters / Speakers / Routing etc in the LINUS Control show file, they can then store a new snapshot in a new location. This will allow fast recall from the front panel of different offline 'States' of the LINUS Control show.

Scenario B). Rental Company –
A hire company may wish to send out small systems with operators who do not wish to use the LINUS Control software & just want to recall the setup from the Front Panel.

Prior to dispatching the equipment, the hire company can configure the different smaller systems that are used and save these as Snapshots, so the end user only needs to choose a Snapshot and Recall it from the Front Panel.

Example – 2x HOPS8's on 2x G15 Subs.
Firstly, the Speakers are assigned to the Amplifier:

| 01 | G15 SF | HP8 PF | G15 SF | HP8 PF | | ● |

The input routing is then assigned:

| 01 | A SF | A PF | B SF | B PF | | ● |
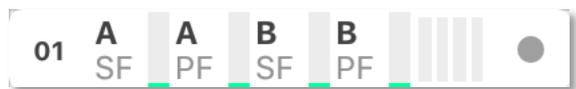
A Tuning Group is then assigned to the G15 Subs, in order to add the 2.2ms co-planar delay (as determined from the time alignment spreadsheet guide).
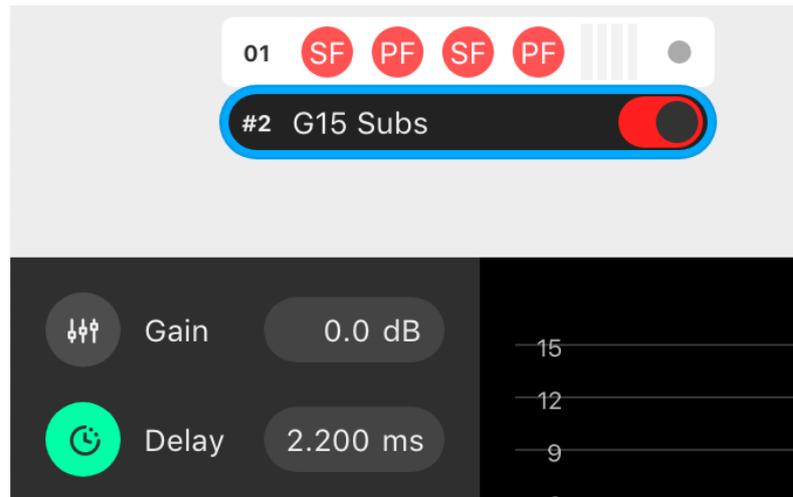
The Snapshot should now be stored on this amplifier, to enable offline recall from the Front Panel on site. Group Parameters (Gain / Delay / EQ etc.. can be adjusted from the Front Panel without use of the computer).

5.5. Clear Global

To clear ALL snapshots in ALL online amplifiers on the network, press the "Clear all Snapshots" button, then confirm this action with the confirmation dialog.

5.6. Global set to defaults

On the AMPS page, a button can be found to launch the "Global set to defaults" dialog:

When pressed, the following dialog will be presented. This dialog allows the user to determine which (if any) parameters they would like reinstated to their default values. This is particularly useful in touring scenarios, where it is desirable to use the same LINUS Control show file from the previous day, but the tuning data would like to be 'zero-ed'.

Pressing will allow all parameters below this to be defaulted, whilst preserving the Amplifier names, fallback states, routing and polarity information.

Global set to defaults

Select parameters to be reset in all amplifiers within the workspace.

☐ Amplifier Names

Amplifier Fallback   ● On   ● Off

Amplifier Routing   ● Analog   ● LiNET

Amplifier Polarity   ● Normal   ● Inverted

▾ **Select All**

☐ Group Gain

☐ Group Delay

☐ Group Array

☐ Group Sizing

☐ Group Distance

☐ Group Subsonic

☐ Group Low Boost

☐ Group Human

☐ Group HF Shelf

☐ Group PEQs

[Cancel]   [Default selected]

5.7.Locking

For LINUS 14 / CON / 10, there are two levels of locking.
For LINUS 10-C and 5-C, there is one level.

- With LINUS 14 / CON / 10, it is possible to either lock the front panel controls (Display Lock) or the entire amplifier with a PIN code (Unit Lock).
- With LINUS10-C or LINUS5-C, only the Display Lock is possible at this time.

Display Lock prevents casual changes being made to the amplifier's front panels; however, the mute buttons are still enabled on the Front Panel.

Note - On LINUS 14 / CON / 10, the Display Lock can be defeated by pressing both the CH1 select button and the STORE button simultaneously.

Unit Lock prevents all changes from the front panel of the amplifier, and does this with a PIN Code, which can be any number, up to 5 digits long. The PIN can be entered from either the Front Panel, or from the LINUS Control software.

Note - In the event of the PIN code being lost, please contact techsupport@codaaudio.com detailing the scenario that has led to the loss of the PIN Code, together with information that substantiates your request for the PIN code to be reset, and instructions will be given. In the situation with an installed system, the local distributor / dealer & installation consultants / contractors will be contacted first to establish the authenticity of the PIN code reset.

To access the amplifier locking dialog, press the relevant padlock icon on the amplifier entry on the AMPS page:
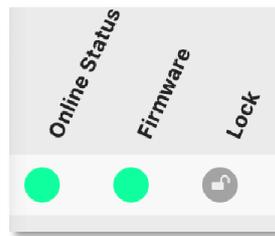
The following dialog will be presented (in the case of LINUS 14 / CON / 10):

Pressing the (Lock) button to the right of the Display Lock text will toggle the display lock state of the relevant amplifier. An 'L' or 'Padlock' icon will be displayed on the amplifier LCD.

Pressing the (Lock) button to the right of the Unit Lock text will present the following dialog, where a password can be set. (This should be numeric, of any value from 0 to 99999 inclusively):
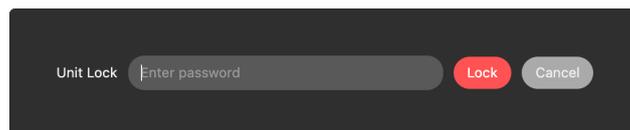
When the lock is set, the icon will change to (Unlock) shown below:

To unlock the amplifier, press this (Unlock) button, then enter the password into the dialog that is presented:
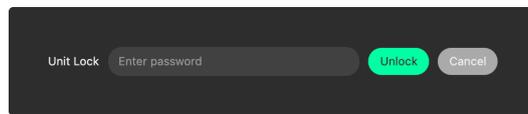
6. Tune Page

6.1. Adjusting Group Parameters
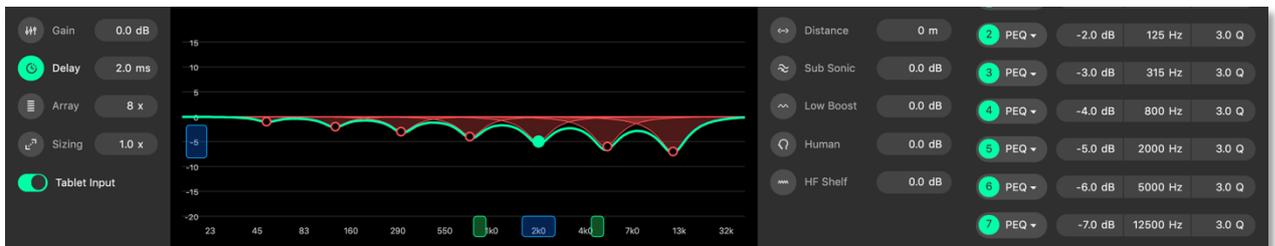
All group tuning parameters are enabled and disabled by clicking on the corresponding icon. A greyed-out icon means the parameter is disabled. A green icon means the parameter is enabled.
When the filter data is adjusted, the filter will be enabled automatically.

Disabled   Enabled
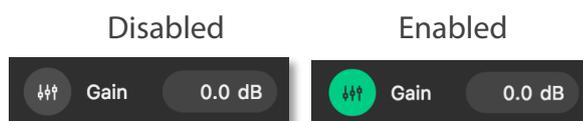
6.2. Absolute vs Relative Filters

When a speaker is assigned to more than one group, an absolute filter can only be active in one group. A relative filter can be active in all groups with the output being the sum of all assigned groups.

Absolute Filters	Relative Filters
Array	Gain
Sizing	Delay
Distance	Human
Subsonic	HF Shelf
Low Boost	
PEQ's	

6.2.1.   Gain

The relative gain of the assigned speakers can be adjusted from +12db to -99db.

6.2.2.   Delay

The relative delay of the assigned speakers can be adjusted from 0mS to 1000mS.
(0 to 200mS in the case of LINUS5-C or LINUS10-C).

6.2.3.   Array Filter

When Line Array speakers are assigned to the group, the absolute Array value can be adjusted from 4x to 24x.
This can only be active within one group per speaker.

6.2.4.   Sizing Filter

The absolute sizing of the assigned speaker can be adjusted from 0.5x to 2.0x.
This can only be active within one group per speaker

6.2.5.   Distance Filter

The absolute distance value for the assigned speakers can be adjusted from 0m to 100m.
This can only be active within one group per speaker

6.2.6.   Sub Sonic Filter

The absolute level of the sub sonic filter which can be adjusted from +12db to -20db.
This can only be active within one group per speaker

6.2.7.   Low Boost Filter

The absolute level of the low boost filter which can be adjusted from +12db to -20db.
This can only be active within one group per speaker

6.2.8.   Human Filter

The relative level of the human filter which can be adjusted from +12db to -20db.

6.2.9.   HF Shelf Filter

The relative level of the HF shelf filter which can be adjusted from +12db to -20db.

6.2.10.   PEQs

There is a total of 7 equalisers per speaker (4x if using a LINUS10-C or LINUS5-C Amplifier) that can be utilised throughout any of the assigned groups.

- Only EQ's that have not been enabled in another group can be used.
- An already enabled EQ in another group will be greyed out.
- Additional EQ's can be added by clicking the Add equaliser button.
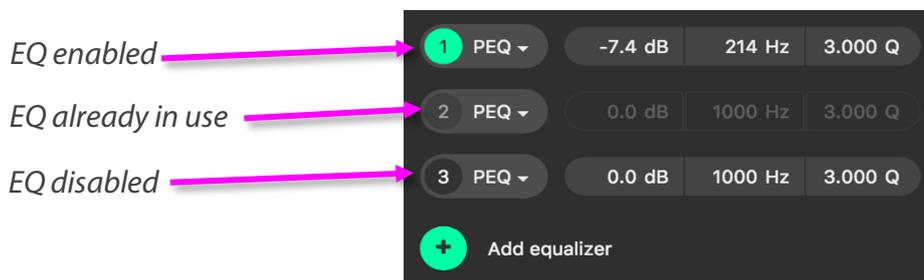

6.2.11.   PEQ Modes

All 7 equalisers can be changed between parametric, high self and low shelf.
Clicking on the dropdown arrow displays the three options, plus the ability to delete the filter.
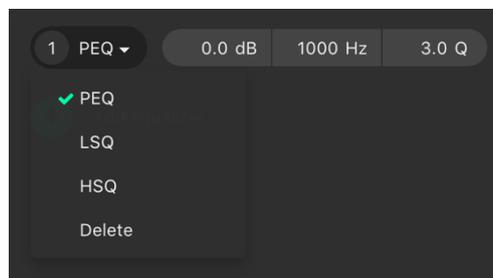
6.2.12.   Click & Drag EQ Window

The gain and frequency of the equaliser can be manipulated by left clicking and dragging the corresponding handle. The PEQ number and gain value is displayed when the cursor moves over the handle.
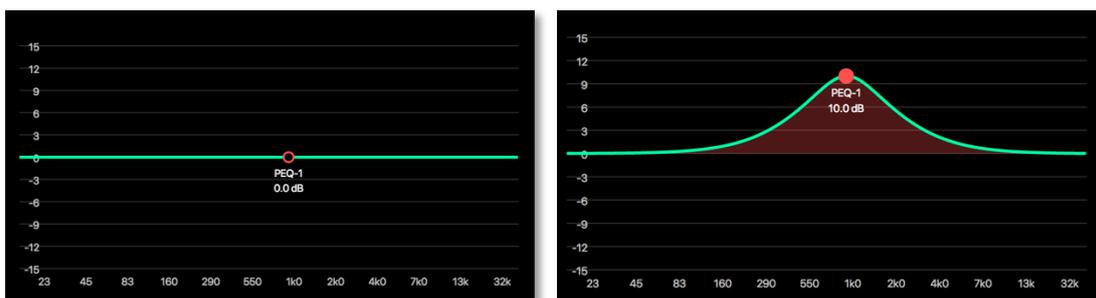
6.2.13. PEQ Handles

The filters can be manipulated within the PEQ Graph by clicking on the filter point on the PEQ graph, then adjusting the handles that appear.
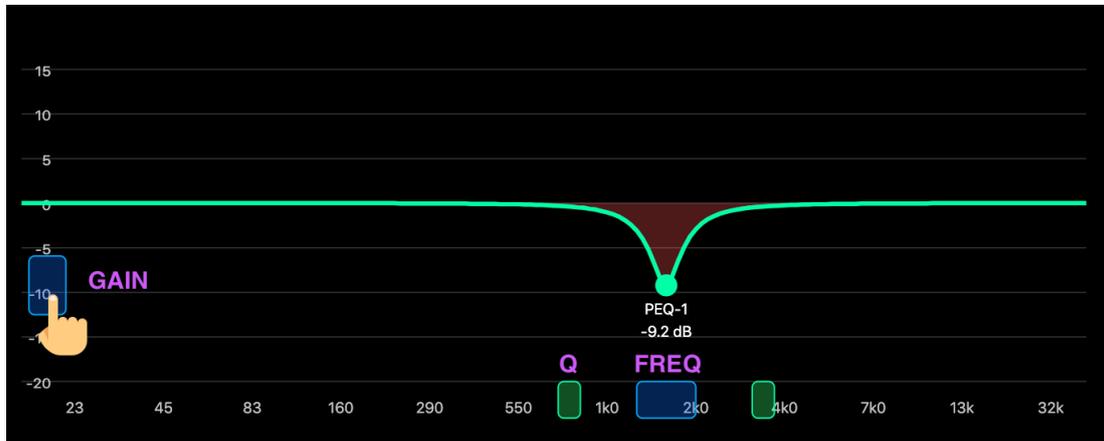
6.2.14. Delete Equaliser

The last equaliser in the equaliser list can be deleted by selecting Delete from the dropdown list. The equaliser must be disabled before the option is displayed.
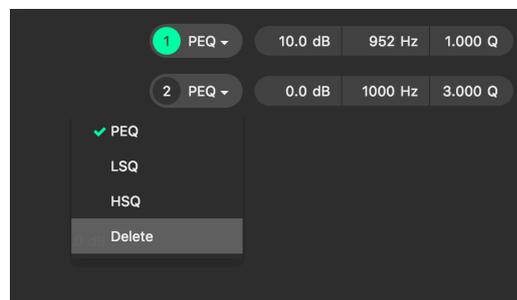
7. Monitor Page

The monitor page provides a detailed view primarily of the metering data for a selected amplifier. Clicking an amplifier in the workspace will display the window below:

7.1. Input Meters

The leftmost 4x meters (2x if LINUS10) are the input meters.

The label underneath each input meter states which input is being monitored, and routed to the respective channel. Peak level is shown in the centre, with the calculated effective RMS power level shown either side:
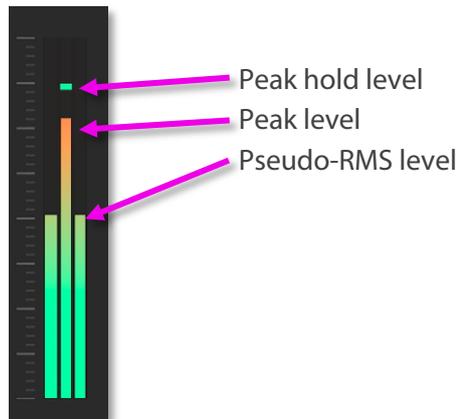

If the input meters are hitting the top (turning orange or red), and the loudspeakers are not in gain reduction, it would be wise to assess the gain structure of the system to prevent overloading or overshooting the input stage. Attenuate the input signal and increase the system gain.

Note - The amplifiers operate internally at 32bit with double precision, which represents a massive internal dynamic range, so it is next to impossible to run out of headroom within the digital signal path inside the amplifier. It would therefore be very beneficial to pay close attention to the gain structure of the system to get the best results in a given deployment.

7.2. Output Meters

The output meters are drawn to the right of the monitor window. The output meter comprises two areas, the output level (peak & RMS) and the limiter gain reduction activity (peak and thermal).

Peak output level
RMS output level
Thermal limiter gain reduction
Peak limiter gain reduction
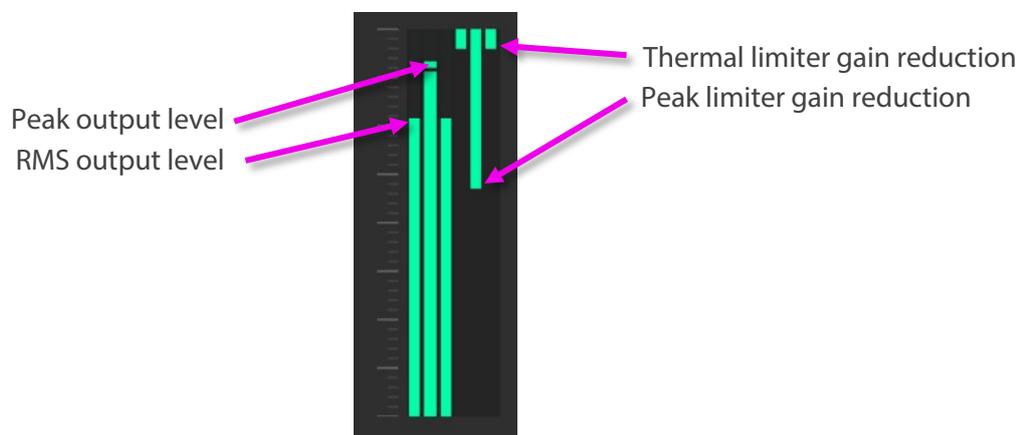
8. Amplifier Discovery

8.1. Network Scanning

When LINUS Control is taken Online, it will search for all amplifiers on the network. It will do one of two things with these amplifiers, either mark them as 'Online' in the workspace providing certain criteria are met, or place them in the discovery list.

Criteria for marking them as 'Online':
- The ID Matches
- The Speaker Files match on all Channels
- The Amplifier has not had a snapshot recalled from the Front Panel.

If these tests are all true, it will be marked 'Online' and the tuning data present in the show file (Group Assignments / Gain / Delay / Filters / Routing etc) will be pushed to the Amplifier.

These tests increase resilience in mistakes arising in the operation of the software during a show, which would otherwise result in the changing or loss of audio.

If any of these tests are not true, the Amplifier will be put in the 'discovery list'. The presence of amplifiers in the 'discovery list' is announced in the bottom taskbar. Clicking the annunciation will result in the 'discovery list' being displayed.
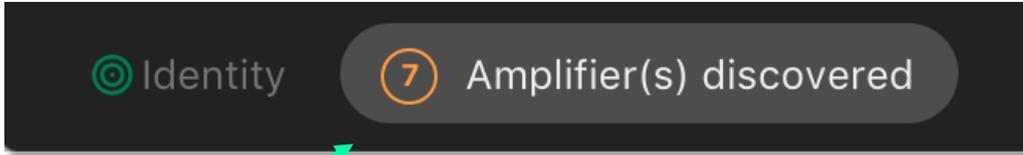
Click the "Amplifiers Discovered" annunciation to see the discovery list:
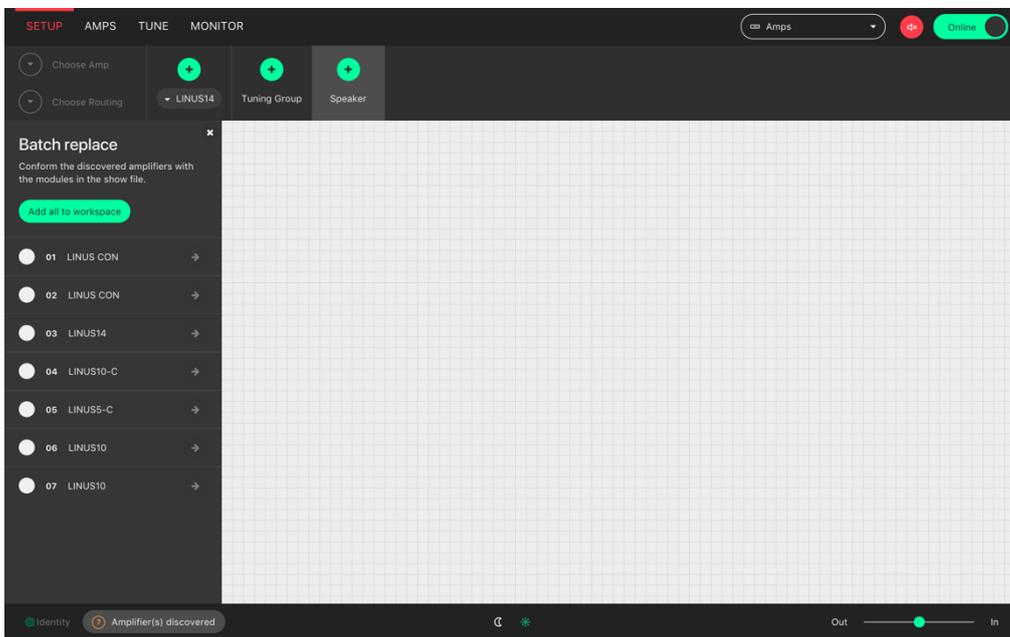
The "Add all to workspace" button will add the amplifiers that were discovered on the network to the workspace. As the confirmation popup dialog suggests, this will clear the amplifiers active state and mute the outputs.
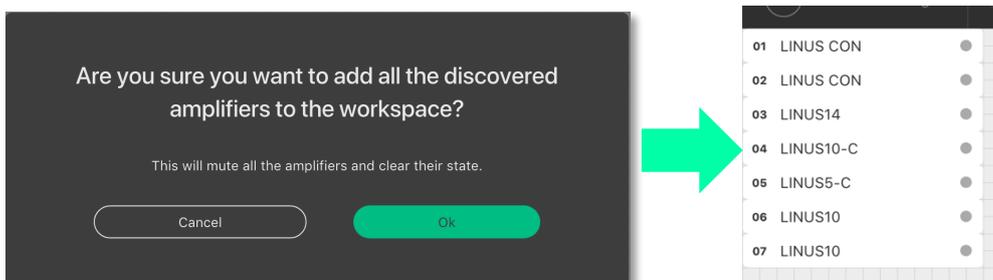
8.2. ID Conflicts

If there are one or more amplifiers in the discovery list that fail one or more of the tests described in section 8.1, however the ID is found in the workspace, an ID conflict is recognised. In this instance, it is not possible to 'Add all to workspace'. Instead you have two choices:

- Add more substitute 'virtual' amplifiers to the workspace, then replace the discovered ones to these,
  -or-
- Replace one of the amplifiers discovered with one already in the workspace.
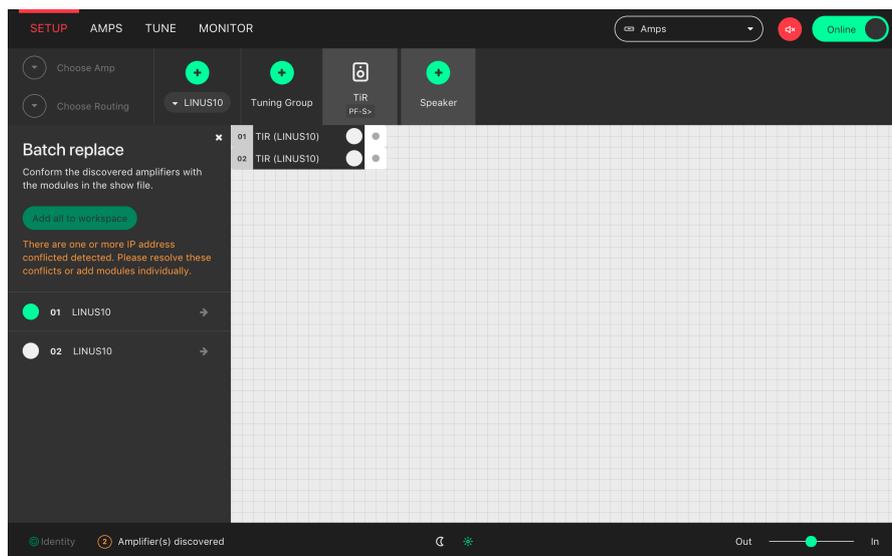
8.3. Matching the discovery list with the workspace

In this example, we have two virtual amplifiers in the workspace, which we want to replace with amplifiers found on the network. Go Online, then Click the discovery list button in the bottom taskbar:
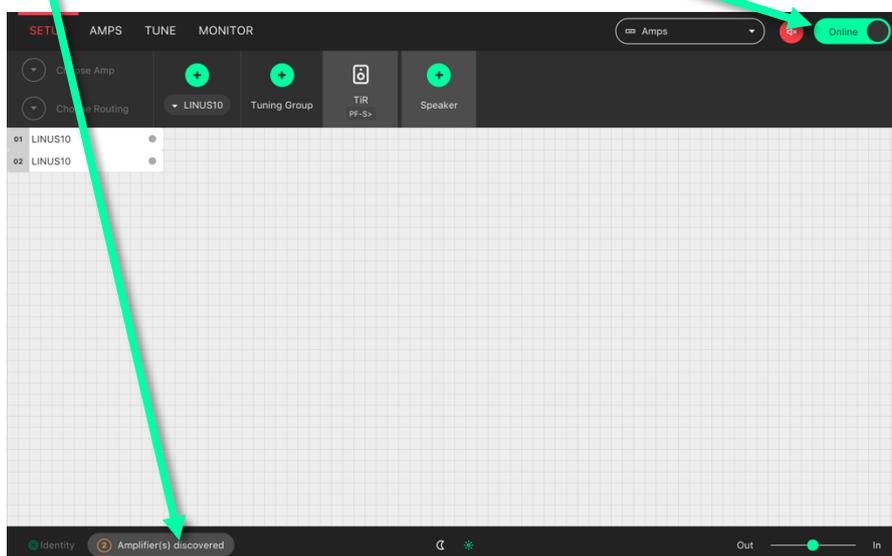
The discovery list is now open & we can see the two amplifiers that were found on the network. Press the circle on the left of the amplifier in the discovery list that you wish to use as the replacement.
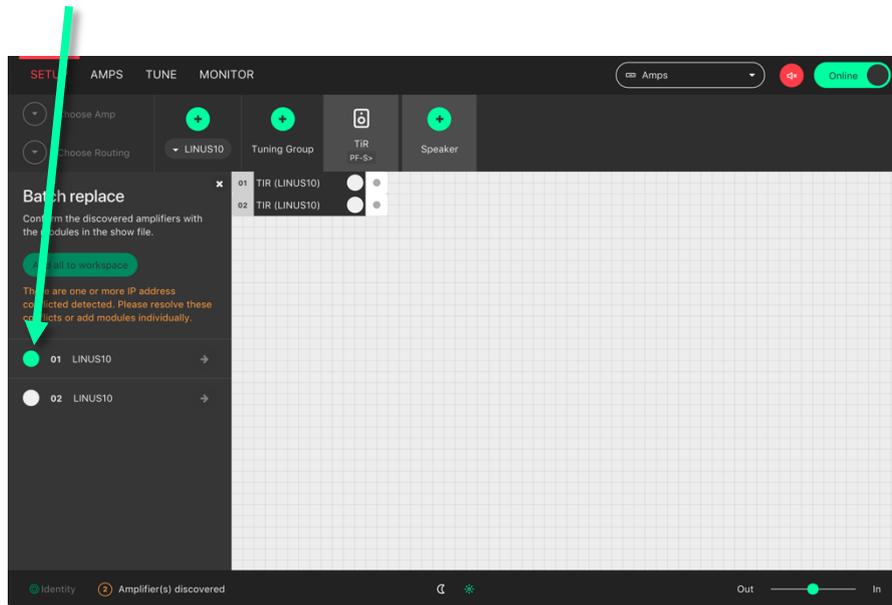
Select the destination amplifier in the workspace that you would like the replacement in the discovery list to take over from. This amplifier can either be Virtual, or Online. If it is an Online amplifier that is chosen as the destination, after the replacement is undertaken, this amplifier will itself then return to the discovery list.
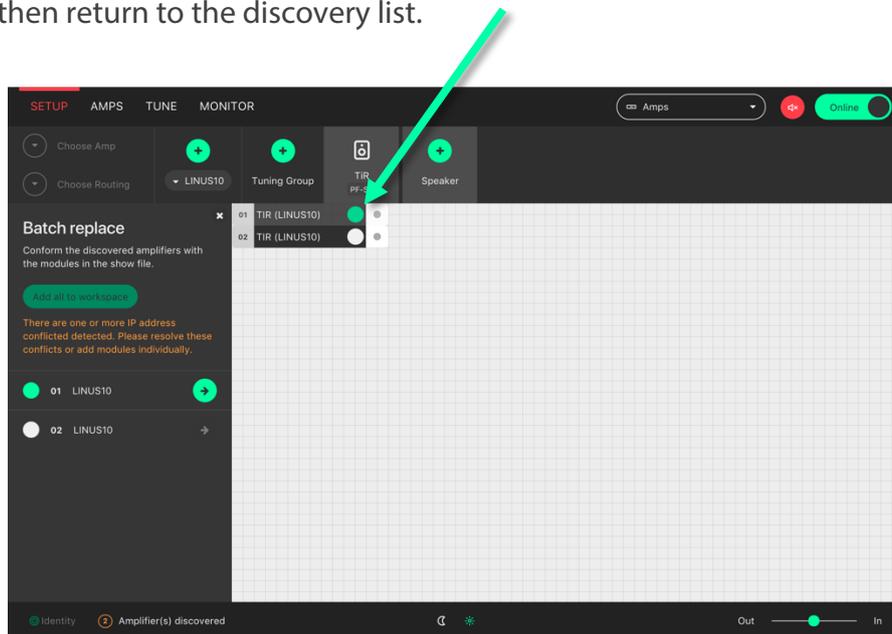
Press the 'arrow' button to invoke the replacement
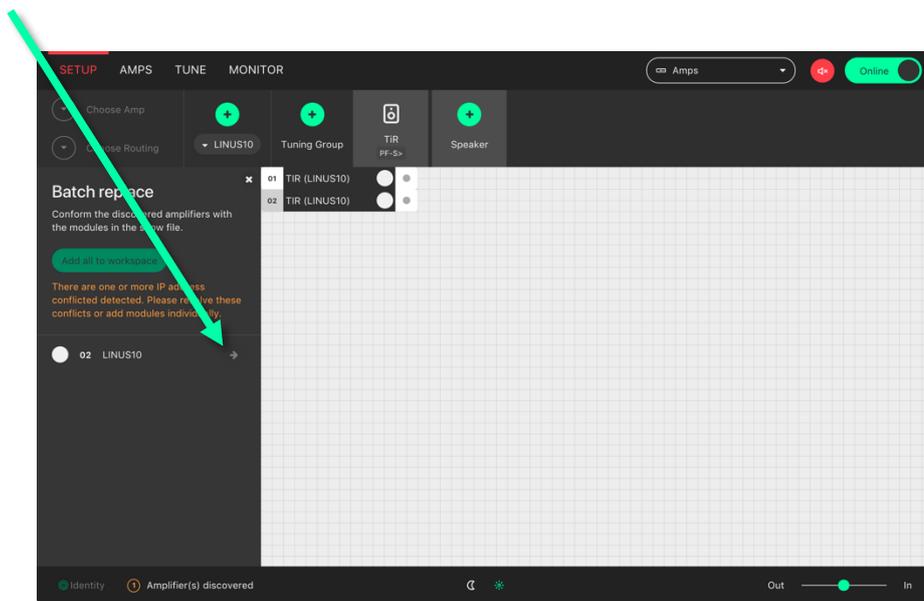
8.4. Autosave

At present, it is not possible to restore a show file from the Amplifiers to the LINUS Control computer.

Note This a high priority feature that is being worked on with most importance. Until this is fully implemented (and after that date too) we recommend saving the show file to an external USB Drive / Network Location post soundcheck, to enable show file recovery should the LINUS Control computer get lost, stolen or otherwise disabled.

Show files will also be autosaved to the Users home directory in a folder called \LINUS Control every 10 minutes. A new file be created every 10 minutes.

Do not solely rely on these Autosaved files, take manual backups of the show file at key times during the working day, the same as would be done for mixing consoles or other equipment, to prevent & mitigate any possible downtime or other outages.

9. Reference - Amplifier Icons

- The Amplifier icon is 'divided' into three areas.
- These areas are 'independent' of each other.
- Network related indications are on the left - (Network Area).
- The amp ID number is always displayed here.
- Input signal format and signal related events are on the right - (Input Signal Area)
- The middle (Detail) area in the amplifier is where conditions are displayed, depending on the users choice from a dropdown menu in the host program.
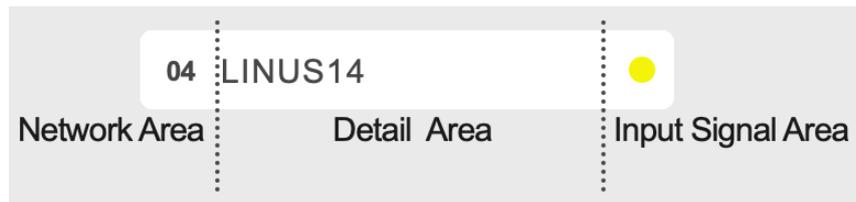
04 LINUS14 ⚫	Virtual Amplifier	*Network Area = Grey*
04 LINUS14 ⚫	Online Amplifier	Network Area = White
04 LINUS14 🟡	Digital Signal Selected (Fallback Disabled) Clock Present	Input Signal Area = Yellow
04 LINUS14 🔴	Digital Signal Selected (Fallback Disabled) Clock Not Present	*Input Signal Area = Red*
04 LINUS14 🟡	Digital Signal Selected (Fallback Enabled) Digital Clock Locked	Input Signal Area = Yellow with Grey Border
04 LINUS14 ⚫	Analog Signal Selected	*Input Signal Area = Grey*
04 LINUS14 🟡	Amp Disconnected	*Network Area = Red*
04 LINUS14 🟡	Amp in Standby	Network Area = Black
04 LINUS14 🟠	Digital Signal Selected (Fallback Enabled) Digital Signal Lost Amp in Analog Fallback	*Input Signal Area = Grey. Orange Background.*
04 LINUS14 🟠	Digital Signal Selected (Fallback Enabled) Digital Signal Recovered Amp in Analog Fallback	Input Signal Area = Grey with Yellow Border.
04 LINUS14 🟡	Amplifier Warning	Detail Area = Orange Background
04 LINUS14 🟡	Amplifier Error	Detail Area = Red Background

10.   References – Keyboard Shortcuts

Keyboard shortcuts have been implemented to enable the user to reach the required screen as fast as possible. The shortcuts are disabled when typing values into either name fields or numerical fields.

Action	Shortcut
Amplifier detail view \ display amplifier type	1
Amplifier detail View \ display amplifier ID and IP address	2
Amplifier detail View \ display amplifier name	3
Amplifier detail View \ display output speaker assignments	4
Amplifier detail View \ display amplifier input routing and levels	5
Amplifier detail View \ display mute buttons and output levels	6
Amplifier detail View \ display the output channel combined gain	7
Amplifier detail View \ display the output channel combined delay	8
Workspace view \ setup page	S
Workspace view \ amplifier page	A
Workspace view \ tuning page	T
Workspace view \ monitor page	M
Add Amplifier to workspace	Cmd + F
Add Group to workspace	Cmd + G
Select all items in workspace	Cmd + A

11. References - IP Schema Old vs New

IP	V1	V2
192.168.1.1	Module 1 Master	Amp 1
192.168.1.2	Module 1 Slave	Amp 2
192.168.1.3	*unused*	Amp 3
192.168.1.4	*unused*	Amp 4
192.168.1.5	*unused*	Amp 5
192.168.1.6	*unused*	Amp 6
192.168.1.7	*unused*	Amp 7
192.168.1.8	*unused*	Amp 8
192.168.1.9	*unused*	Amp 9
192.168.1.10	LINUS Live	Amp 10
192.168.1.11	Module 2 Master	Amp 11
192.168.1.12	Module 2 Slave	Amp 12
192.168.1.13	*unused*	Amp 13
192.168.1.14	*unused*	Amp 14
192.168.1.15	*unused*	Amp 15
192.168.1.16	*unused*	Amp 16
192.168.1.17	*unused*	Amp 17
192.168.1.18	*unused*	Amp 18
192.168.1.19	*unused*	Amp 19
192.168.1.20	LINUS Live	Amp 20
192.168.1.21	Module 3 Master	Amp 21
192.168.1.22	Module 3 Slave	Amp 22
192.168.1.23	*unused*	Amp 23
192.168.1.24	*unused*	Amp 24
192.168.1.25	*unused*	Amp 25
192.168.1.26	*unused*	Amp 26
192.168.1.27	*unused*	Amp 27
192.168.1.28	*unused*	Amp 28
192.168.1.29	*unused*	Amp 29
…		
192.168.1.248	*unused*	Amp 248
192.168.1.249	*unused*	Amp 249
192.168.1.250	LINUS Live v1.2x.	Amp 250
192.168.1.251	*unused*	LINUS Control