



EtherSound

SETUP GUIDE



March 2013

About this Guide

In recent years, several network technologies have emerged for centralized management and control of large scale audio installations. This guide focuses on EtherSound, a digital audio transmission protocol developed by Digigram of France. Using a single CAT5e cable, up to 64 channels of audio may be transmitted in both directions. Compliant with IEEE802.3 (100Base-TX), EtherSound networks can travel through infrastructure made with widely available, low cost, Ethernet computer switches and cables at a much lower cost than traditional analog installations. Latency, 104 μ seconds plus 1.4 μ seconds per additional EtherSound device or approximately 20 μ seconds per network switch on the signal path, is held to a minimum, and is a major reason why EtherSound is receiving increasing acceptance in Sound Reinforcement applications where monitoring delays are critical.

In this document, "EtherSound Setup Guide", configuration of networks using Yamaha EtherSound products and procedures for utilizing the capabilities of EtherSound technology to the fullest are presented.

Update History

Jan. 2009	First edition
Apr. 2010	p.32 Added a note on head amp control when using LS9-32 p.33 Added side notes on remote HA control setup for LS9-32 p.40 Modified the description on how to configure the head amp control for SB168-ES and NAI48-ES p.41 Added side notes on D-sub 9 pin cables used for head amp control p.52-53 Added side notes on the Auto Configure function of M7CL-48ES and SB168-ES System
Mar. 2013	The application name of AVS ES-Monitor has changed since version 3.17.0, and is now known as AVS-Monitor. p.21 Added a restriction for patch editing in Net Patch Mode p.52 Added a caution for patch editing. p.54 Added a caution for patch editing.

Contents

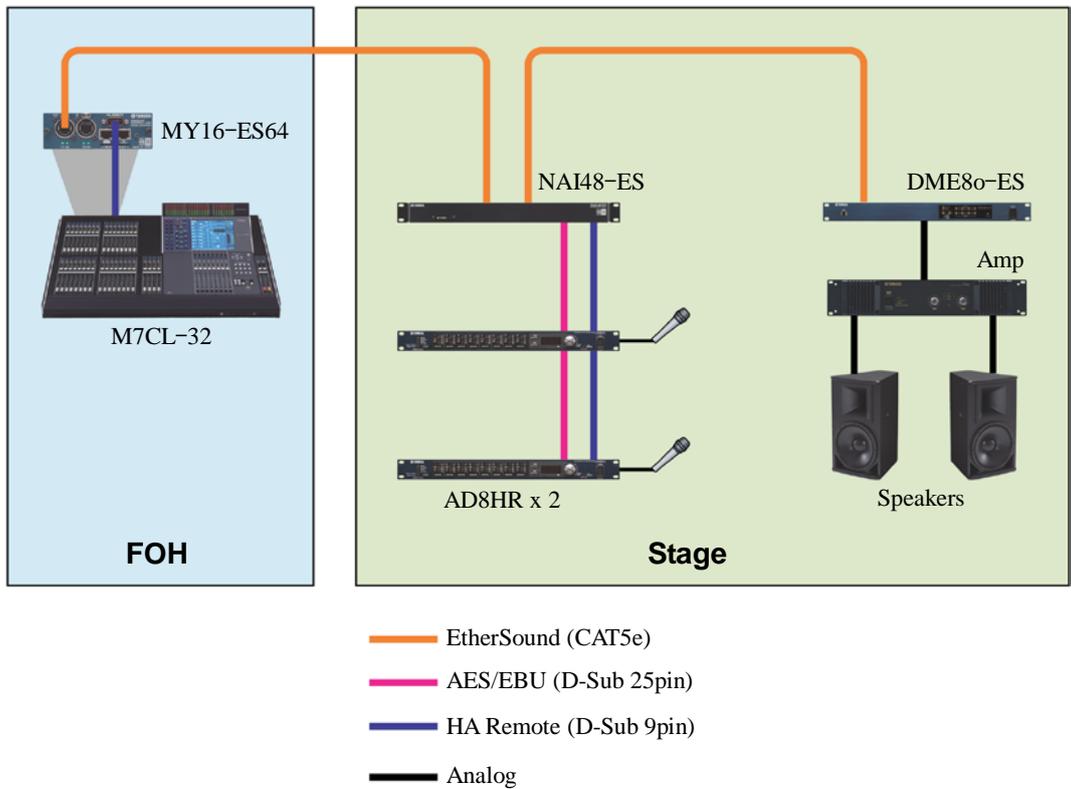
Step 0	System Description	3
Step 1	Physical Setup	4
Step 2	Launching AVS-Monitor	6
Step 3	Bidirectional Loop Settings	9
Step 4	Wordclock Settings	16
Step 5	Making Audio Patches	21
Step 6	Remote Head Amp Control	30
Step 7	Making the System Redundant	42
Step 8	Saving your Configuration	51

Side Notes and Additional Explanations

Maximum Cable Length	4
EtherSound Topologies	5
Configuring AVS-Monitor	7
Bidirectional Loops	10
The Start Loop Parameter	11
Tree Topology	15
Audio Patches When Using 96kHz	29
Overwriting Channels	29
MY card Serial Port Mode	32
Remote Head Amp Control Setup for LS9-32	33
Head Amp Control with AVY16-ES / AVY16-ES100	37
Head Amp Control with Multiple Receiving Devices	38
Head Amp Control with Multiple NAI48-ES	39
Head Amp Control with SB168-ES	40
D-Sub 9pin Cables for Head Amp Control	41
Wordclock for Ring Topologies	50
AuviTran Firmware for Ring Topologies	50
Auto Configure Function of M7CL-48ES and SB168-ES System	52
Quick Setup Function of SB168-ES and MY16-ES64 System	54

Step 0 System Description

We will use a typical example to explain the configuration procedure for EtherSound networks.



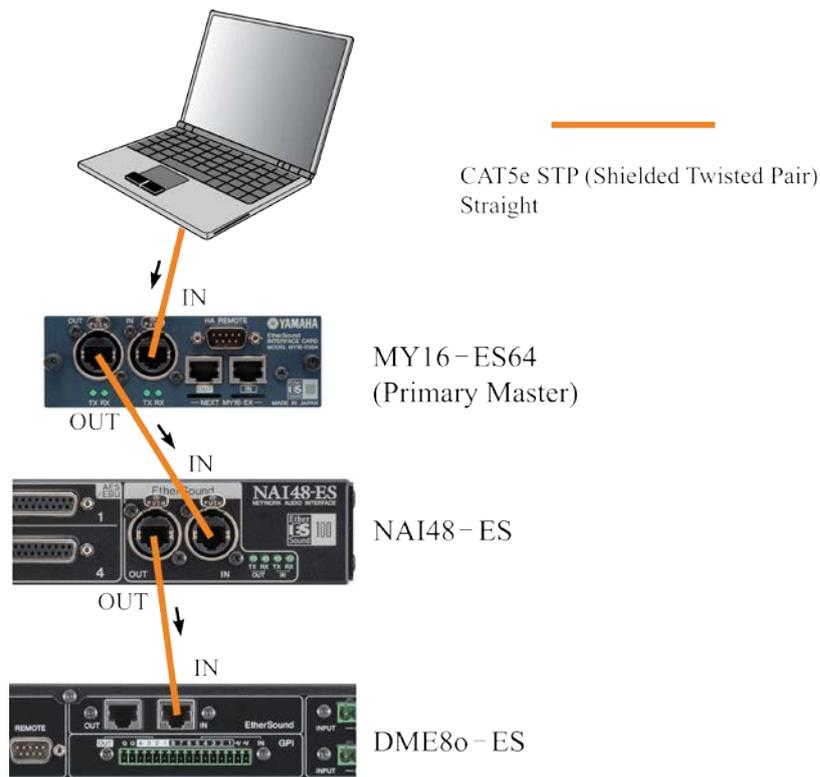
System Components

- one M7CL-32 Digital Mixing Console equipped with one MY16-ES64 EtherSound Interface Card as the FOH console
- one NAI48-ES Network Audio Interface connected to two AD8HR AD convertors with Remote Preamps for 16 mic inputs
- one DME80-ES Digital Mixing Engine Satellite for speaker output processing
- Microphones, Power Amps, and Speakers

Step 1 Physical Setup

Connecting Devices

Connect EtherSound devices in a daisy chain by connecting the OUT port of one device to the IN port of the next device. The first EtherSound device in the daisy chain is called the “**Primary Master**”. The Primary Master supplies the wordclock for the EtherSound network. Connect the setup PC to the unconnected IN port of the Primary Master.



Maximum Cable Length

The specified limit for CAT5e cables is 100 meters under ideal conditions. However when using cable lengths near the 100 meter limit, minor things such as squashed or bent cables or slight variations in terminal contact pressure, may make the difference between communication and non-communication. To avoid such problems it is advisable to keep cable lengths less than 100 meters. Depending on the cable chosen and its condition, most cables work reliably at 80 meters. (For more details refer to <http://www.ethersound.com/>).

Each time an EtherSound packet passes through a device it is rebuilt so it is ready to travel another 100 meters. If distances over 100 meters are required it is necessary to use an active device such as a switch to extend the cable or use a convertor to optical fiber.

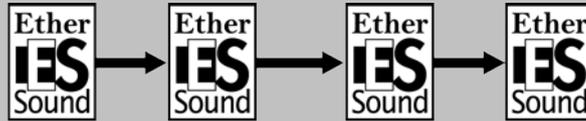
Note: the 100 meter distance limit is the maximum distance between any two devices on the network, and does not apply to the total transmission length of the entire network.

EtherSound Topologies

EtherSound networks may be configured in the following topologies.

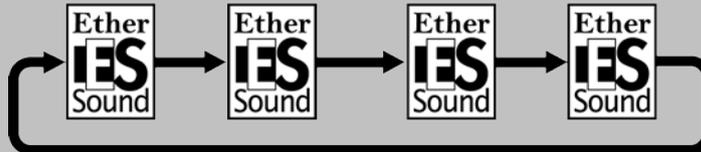
Daisy Chain

Devices are simply connected in a single line.



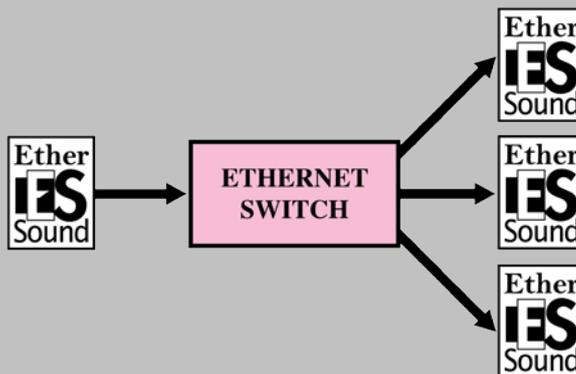
Ring

The ring topology may be considered a variant of the daisy chain created by connecting the first and last devices together. Connecting devices in a ring topology makes it possible to make the system tolerant to cable faults.



Tree

Standard Ethernet switches can be used to create Tree topology. However, when using such topologies, branches below the switch must be unidirectional. (See the side notes on Tree Topology).

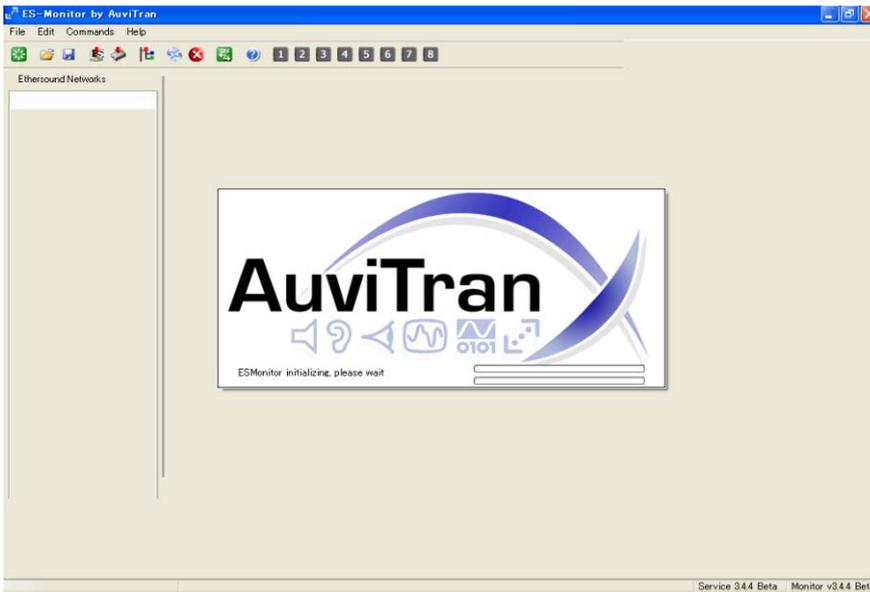


Step 2 Launching AVS-Monitor

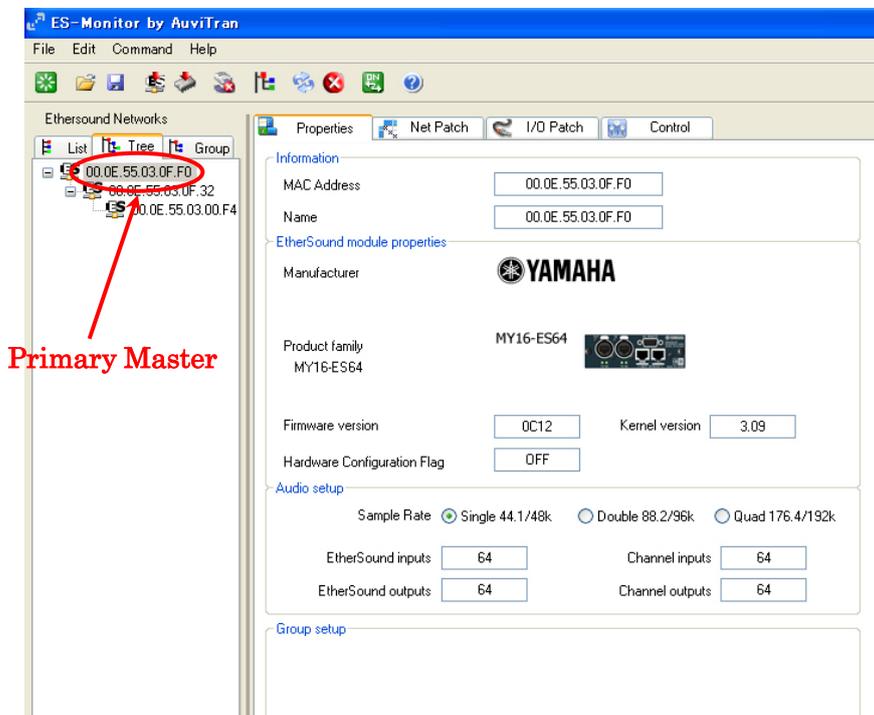
EtherSound is a very flexible system supported by many manufacturers for many differing purposes. To setup and monitor EtherSound devices Yamaha recommends AVS-Monitor by AuviTran. This program can be used to setup other manufacturers' devices at the same time as Yamaha's.

AVS-Monitor may be downloaded from: <http://www.auvitran.com>

- ① Apply power to all devices in the system, and start AVS-Monitor by selecting
Windows Start Menu >> AuviTran >> AVS-Monitor >> AVS-Monitor



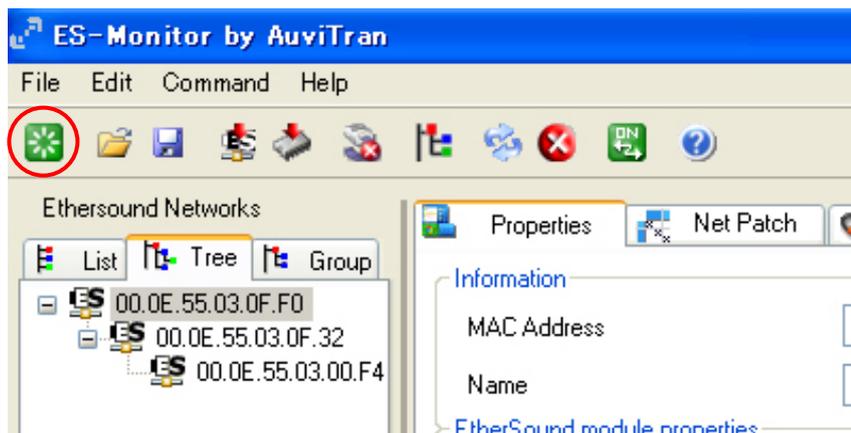
- ② Click on the Tree view tab in the left-hand pane of AVS-Monitor.



In the Tree view tab, devices appear in the order they are connected, starting at the Primary Master.

Step 2 Launching AVS-Monitor

- ③ If devices do not appear as intended, recheck physical connections, and press the “Reset ES Network” button.



Configuring AVS-Monitor

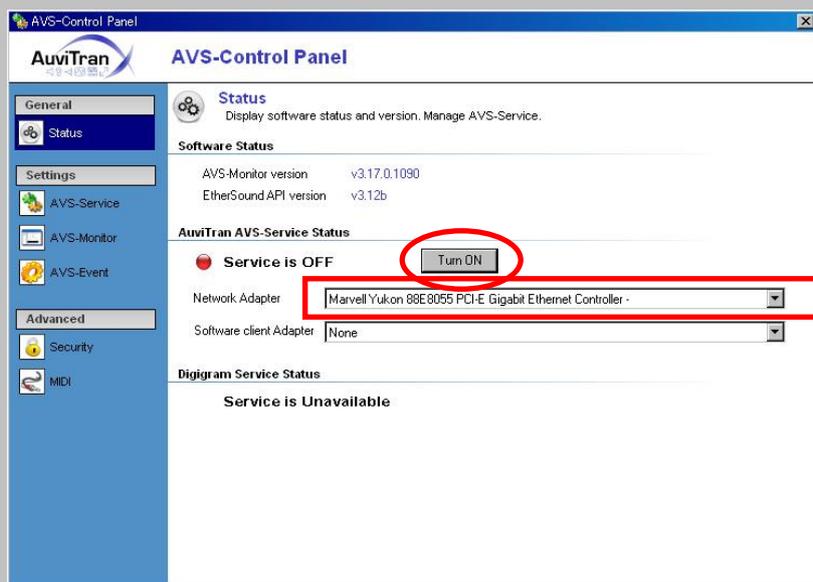
The first time you use AVS-Monitor, you must turn AuviTran service ON and select the network adapter which is connected to your EtherSound network.

From Windows Start Menu, select

Programs >> AuviTran >> AVS-Monitor >> AVS-Control Panel

In the Status tab,

- ① In the Network Adapter box, select the network adapter which is connected to your EtherSound network.
- ② Press the “Turn ON” button.



Other settings can be left at their default values. For details on AVS-Control Panel settings, refer to AVS-Monitor USER'S MANUAL available from the AuviTran Web site.

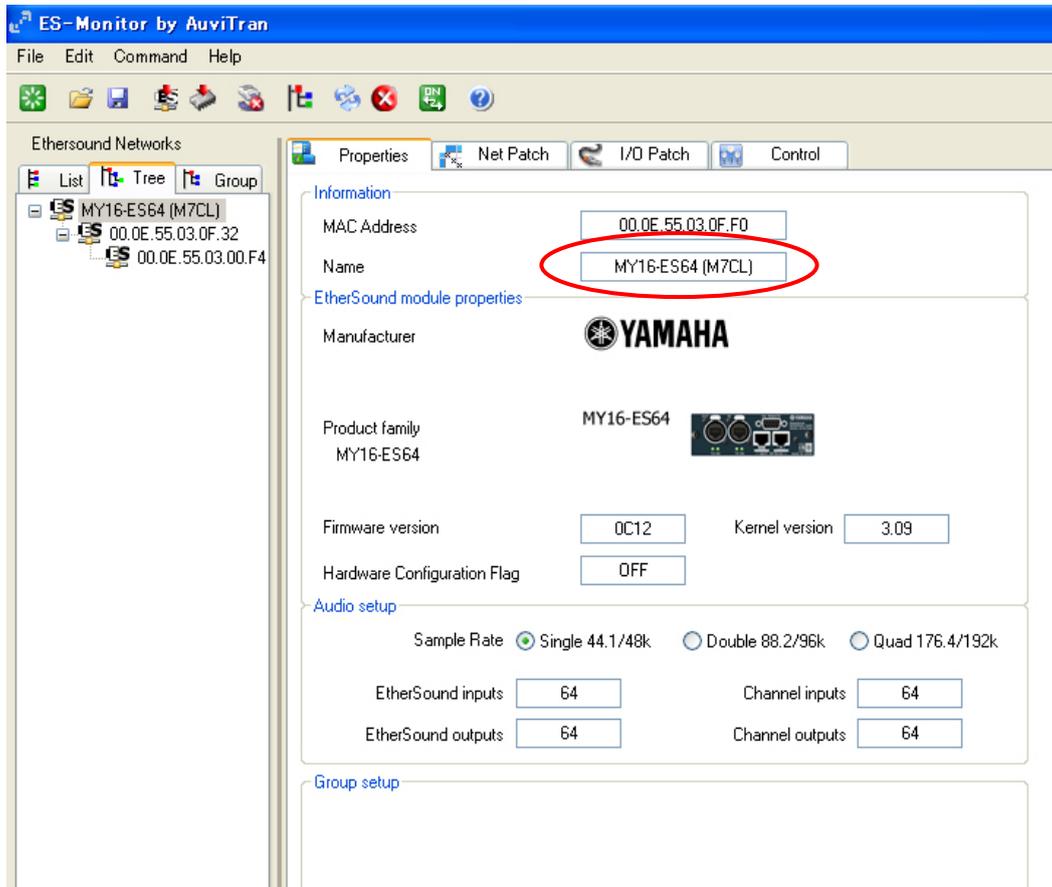
Setting device names

By default AVS-Monitor identifies devices by their MAC addresses, (a 12 digit hexadecimal number).

To make configuration operations easier, it is recommended to set names for each device.

For each device:

- ① Select the device in the Tree view or List view.
- ② Click on the properties tab.
- ③ In the “Name Box”, type in a name.



In this example set the following names for the three devices.

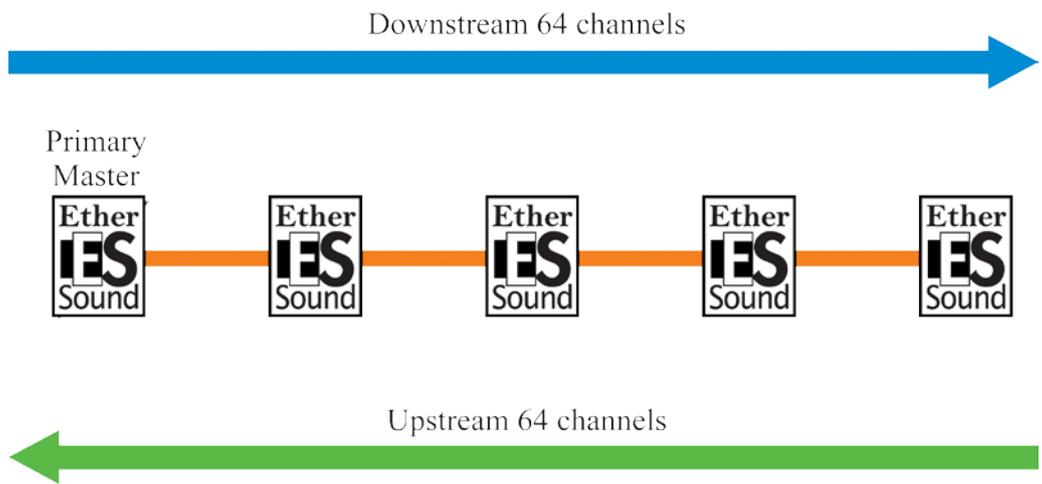
- **MY16-ES64 (M7CL)**
- **NAI48-ES**
- **DME80-ES**

Note: The name is stored in your computer and not the EtherSound device. If you connect to the device with a different computer, then the name will not appear.

Step 3 Bidirectional Loop Settings

Audio transfer on EtherSound networks takes place in two directions; away from the Primary Master and towards the Primary Master. Data flow away from the Primary Master is referred to as “**Downstream**”, data flow towards the Primary Master is referred to as “**Upstream**”.

Up to 64 channels of audio may be carried in each direction. An audio data sent by one device can be received by all following devices. In order to use upstream channels, a “bidirectional loop” must be configured.

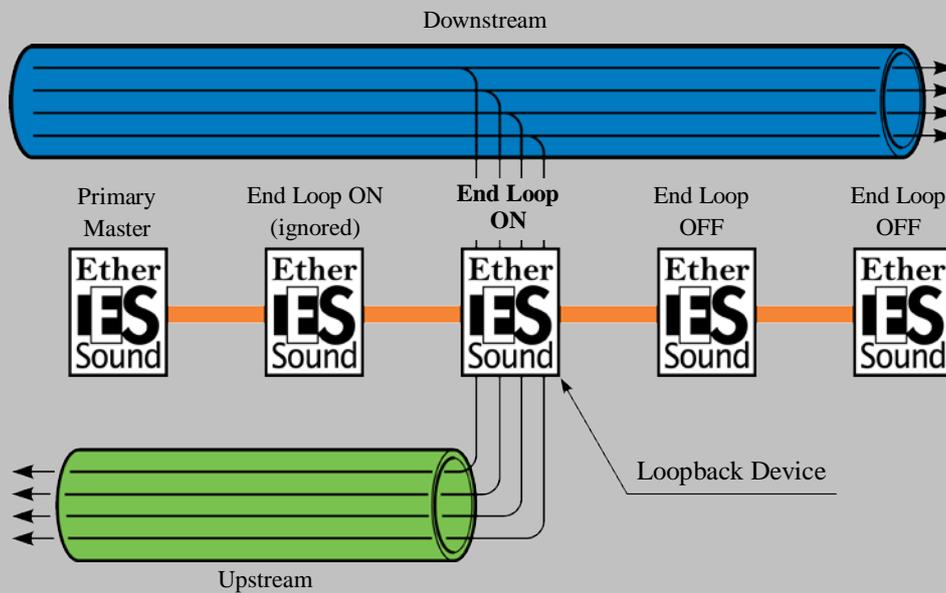


Step 3 Bidirectional Loop Settings

Bidirectional Loops

A bidirectional loop is a segment of the network where data may be transferred in both upstream and downstream directions. In most cases, it is desirable for the network to be bidirectional. However there are some cases where data transfer must be mono directional. (See the side notes on the Tree Topology.) EtherSound allows the user to specify which segments of the network are bidirectional.

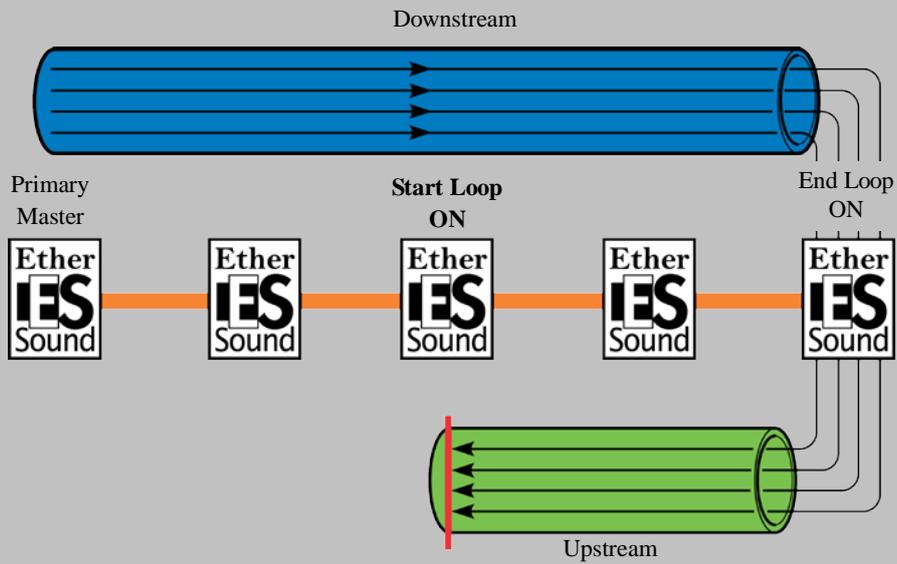
The starting point of a bidirectional loop is the primary master device, unless another device has its Start Loop parameter set to ON. (See the side notes on The Start Loop parameter). The end of a bidirectional loop is a device called the Loopback device. The Loop Back device is a device having its End Loop parameter set to ON. If there are several devices with End Loop set to ON, the Loopback device will be the one furthest from the Primary Master. At the Loop Back device, downstream channels will be looped back onto upstream channels.



Note: When using End Loop, downstream channels will still be transmitted beyond the loopback device. Setting a device as the end of the loop does not prevent data from being transmitted further downstream.

The Start Loop Parameter

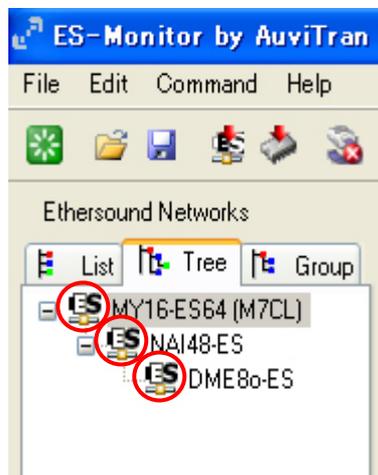
The beginning of a bidirectional loop is typically the Primary Master device. This can be modified by setting the Start Loop parameter on at the desired device. The Start Loop Parameter ends a bidirectional loop by blocking upstream channels from travelling further upstream. The Start Loop Parameter is required for tree and star topologies. See the side notes below on Tree Topology.



Checking current bidirectional loop settings

When AVS-Monitor is launched, previously stored settings are retrieved from the devices. We must first check the current settings.

Select Tree view. The current bidirectional loop settings can be determined from the icons appearing to the left of each device.



If the following icon appears, the device is in mono directional mode (downstream only).



If any one of the following icons appears, the device is part of a bidirectional loop.



First device of a bidirectional loop



Intermediate device of a bidirectional loop



Last device of a bidirectional loop

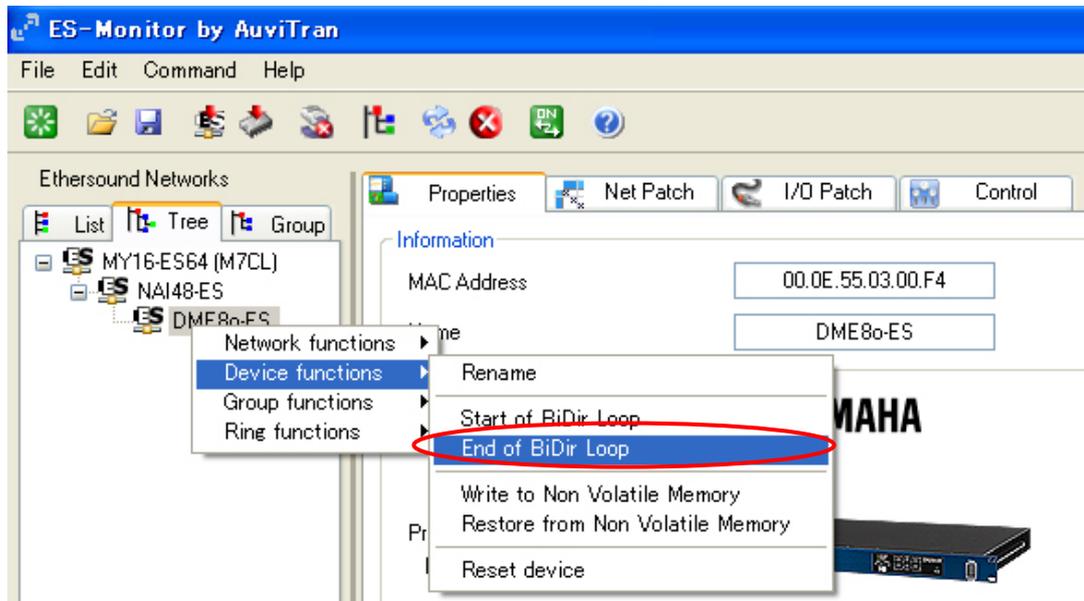
A detailed explanation of the meanings of AVS-Monitor icons is given in the AVS-Monitor User's Manual.

Step 3 Bidirectional Loop Settings

End Loop settings

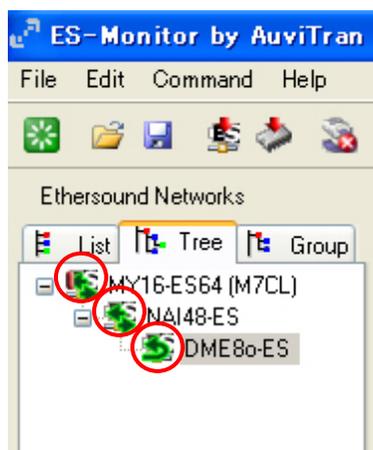
For our example we need a bidirectional loop to span the entire network. The start of the loop is by default the Primary Master device. Assuming that the network was in mono directional mode, we simply need to set the End Loop parameter on at the last device, DME80-ES.

- ① Select DME80-ES in Tree view.
- ② To turn the End Loop settings off, right click DME80-ES in Tree view and move the mouse to highlight “Device functions” as shown below.



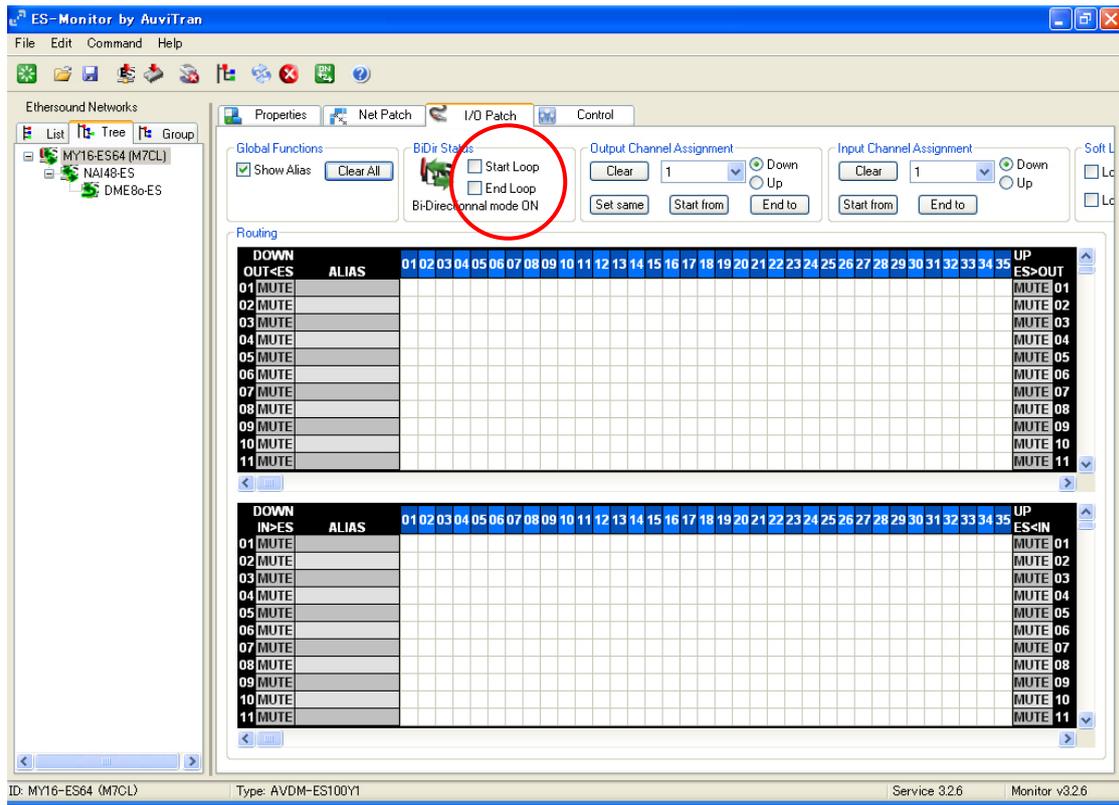
A check mark appearing to the left of “End of BiDir Loop”, indicates that the “End of BiDir Loop” parameter is on.

Devices which are part of a bidirectional loop will be indicated with green icons in Tree view as shown below.



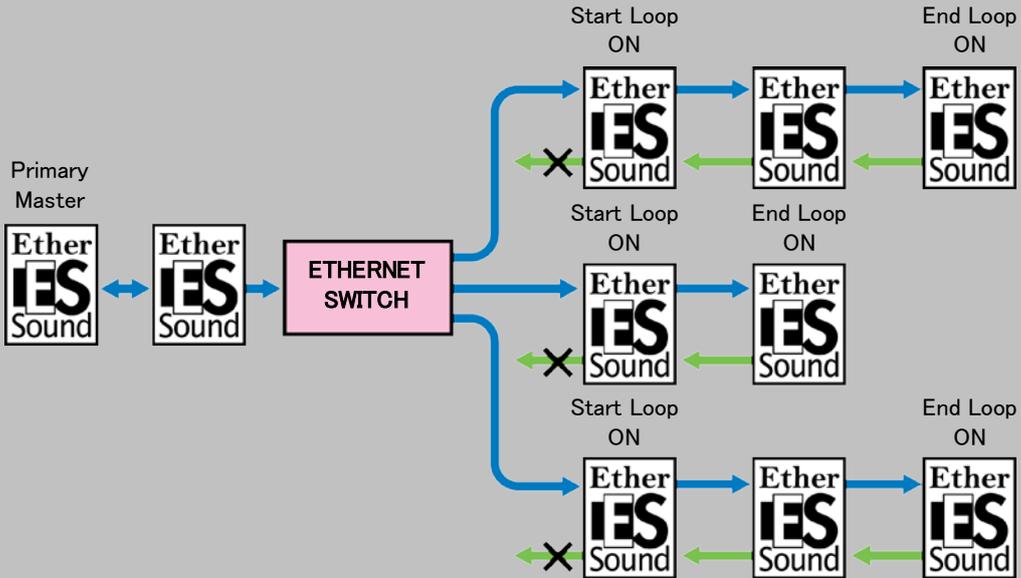
Step 3 Bidirectional Loop Settings

Note: The “End of BiDir Loop” and “Start of BiDir Loop” parameters may also be viewed and modified in I/O Patch tab of each device.



Tree Topology

EtherSound was designed primarily for Daisy Chain and Ring topologies. However, in some cases, physical location of devices may favor a topology having branches. Such a topology is called Tree topology. When using Tree topologies, devices below the switch are not allowed to transmit on upstream channels through the switch. Devices must be prevented from transmitting upstream by checking the Start Loop parameter of devices immediately below the switch.



Step 4 Wordclock Settings

In daisy chain EtherSound networks the device furthest upstream is the Primary Master device, and is always the wordclock master for the EtherSound network. Thus the wordclock master for the network does not need to be specified by the user. The wordclock settings for each device will depend on if the device is Primary Master or Non-Primary Master.

Notes: In Fault Tolerant Ring topologies since there is no “first” device, the wordclock master must be specified by the user. Refer to Step 7) Making the System Redundant.

Wordclock Source and Sampling Frequency

Wordclock source and Sampling frequency settings differ depending on the device.

■ MY16-ES64 (M7CL) settings

Wordclock Source

The wordclock source setting depends on if the device is Primary Master or Non-Primary Master.

Primary Master

Select “INT”(internal) or any non-EtherSound network wordclock source.

Non Primary Master

Select “SLOT”, (the slot containing the MY16-ES64 card) as the wordclock source.

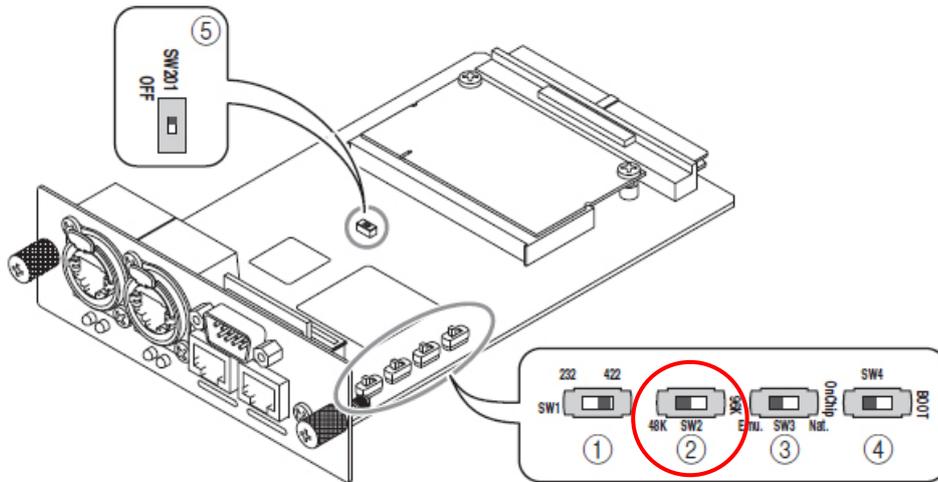
In this example, since the MY16-ES64 (M7CL) is the Primary Master, it must supply wordclock to the network. For our example, set the M7CL’s wordclock source to “INT 48kHz”.



Step 4 Wordclock Settings

Selection of Sampling Rate

The dip switch “SW2” on MY16-ES64 must be set to “48K” (when using 44.1/48 kHz) or “96K” (when using 88.2/96 kHz). In this example, since we are using 48 kHz, set SW2 to “48K”.



Note: The choice between 44.1 and 48 kHz or 88.2 and 96 kHz is made by changing the settings of the device hosting MY16-ES64. The same dip switch setting must be made for all MY16-EX cards connected to MY16-ES64.

■ **NAI48-ES settings**

Wordclock Source

The wordclock source setting depends on if the device is Primary Master or Non-Primary Master. We have the following options:

Primary Master

W. Clock

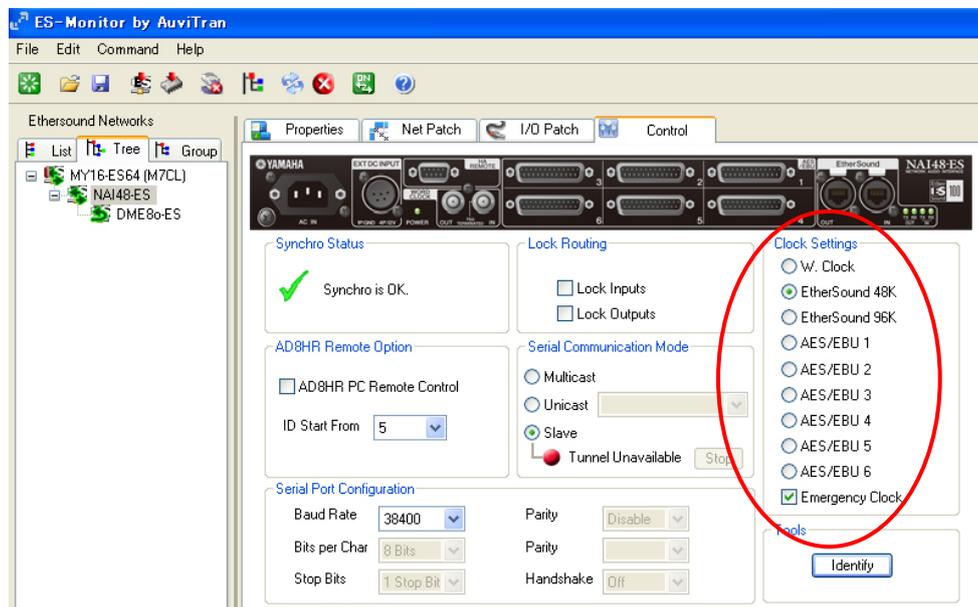
AES/EBU 1~6

Non Primary Master

EtherSound 48K

EtherSound 96K

In this example, since NAI48-ES is receiving the 48kHz wordclock from the Primary Master, select "EtherSound 48K" in the AVS-Monitor NAI48-ES Control tab.



Selection of Sampling Rate

Since NAI48-ES itself does not have an internal wordclock generator, it must receive wordclock from an external source. Thus selection of the wordclock source also determines the sampling frequency.

■ DME80-ES settings

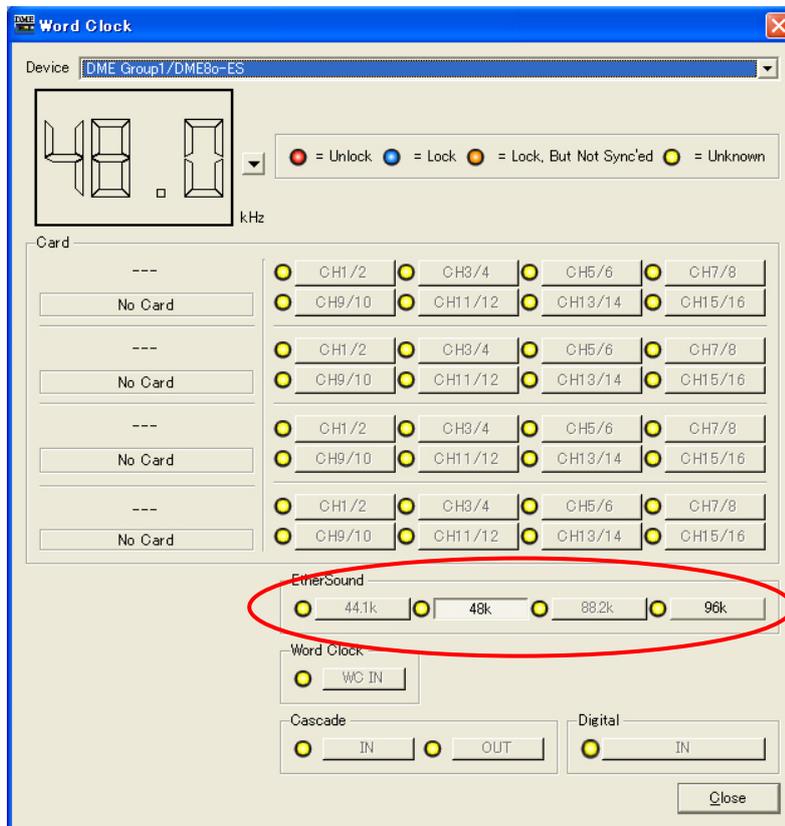
Wordclock Source

Since the selection of wordclock source for DME Satellite ES series devices (DME8i/8o/4io-ES) is performed automatically, there is no user wordclock source setting.

DME Satellite ES series devices synchronize to an internal EtherSound wordclock module. This wordclock module automatically configures itself as wordclock master or slave depending on if the device is Primary Master or Non-Primary Master.

Selection of Sampling Frequency

To select sample rates for DME Satellite ES devices, open the Wordclock screen from the DME Designer “Hardware” menu.

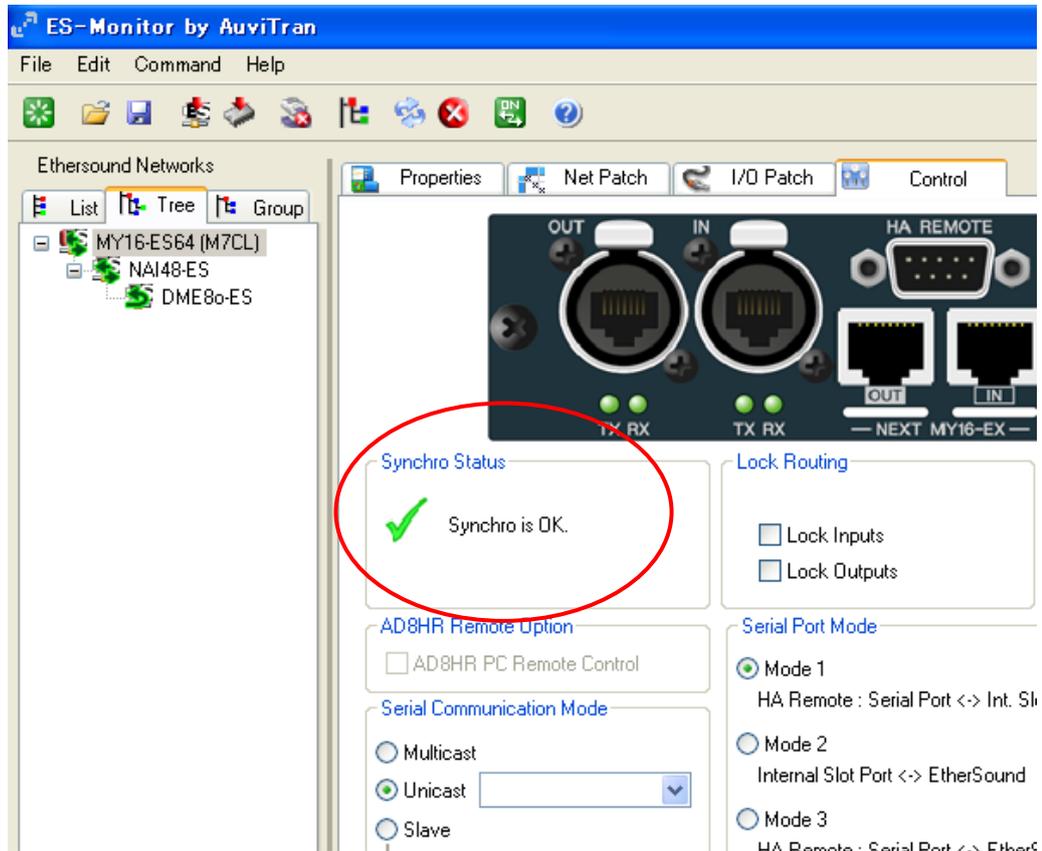


Verifying wordclock settings

If the network is properly synchronized, a check mark will appear in the Synchro Status box of each device on the network.

For all devices:

- ① Select device in Tree view.
- ② Select Control tab.
- ③ Verify that a check mark appears in Synchro Status.

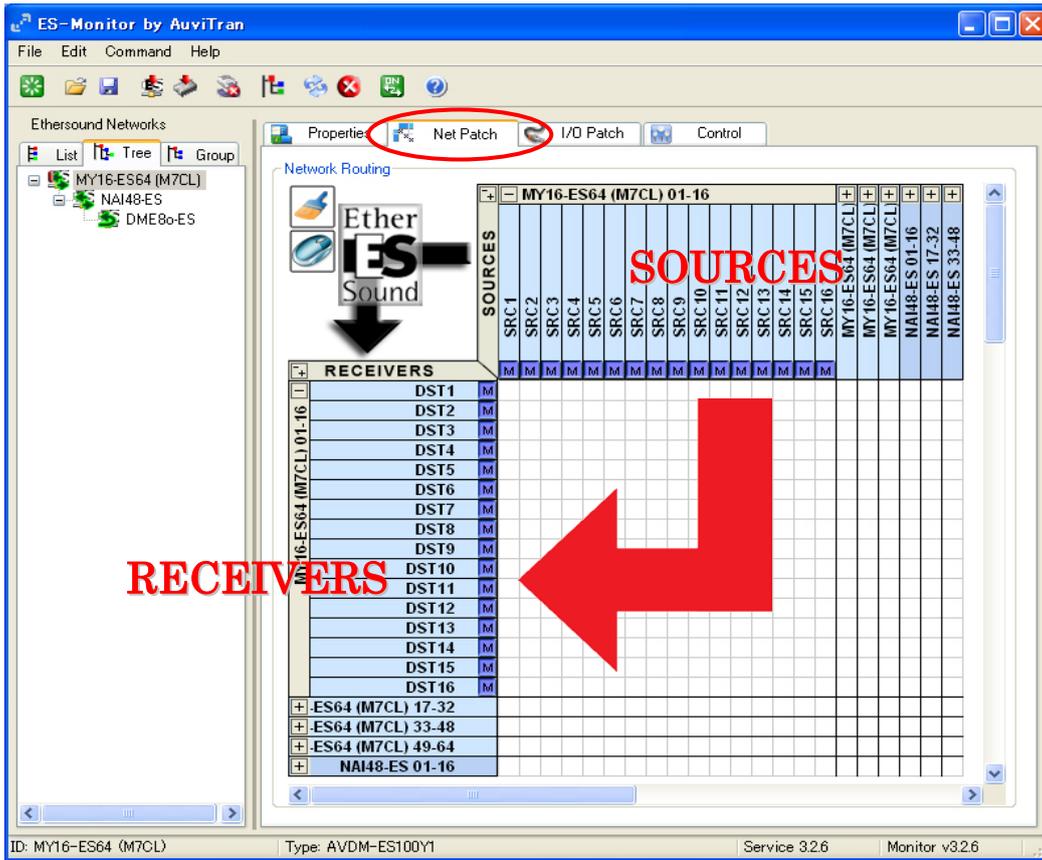


Step 5 Making Audio Patches

AVS-Monitor has two views for setting up patches, Net Patch view and I/O Patch view.

Net Patch View

In Net Patch view, you can make patches directly between SOURCES (outputs of the device to the EtherSound network) and RECEIVERS (inputs of the device from the EtherSound network). When making patches with Net Patch view, AVS-Monitor automatically assigns EtherSound channels and in some cases modifies Bidirectional Loop parameters.



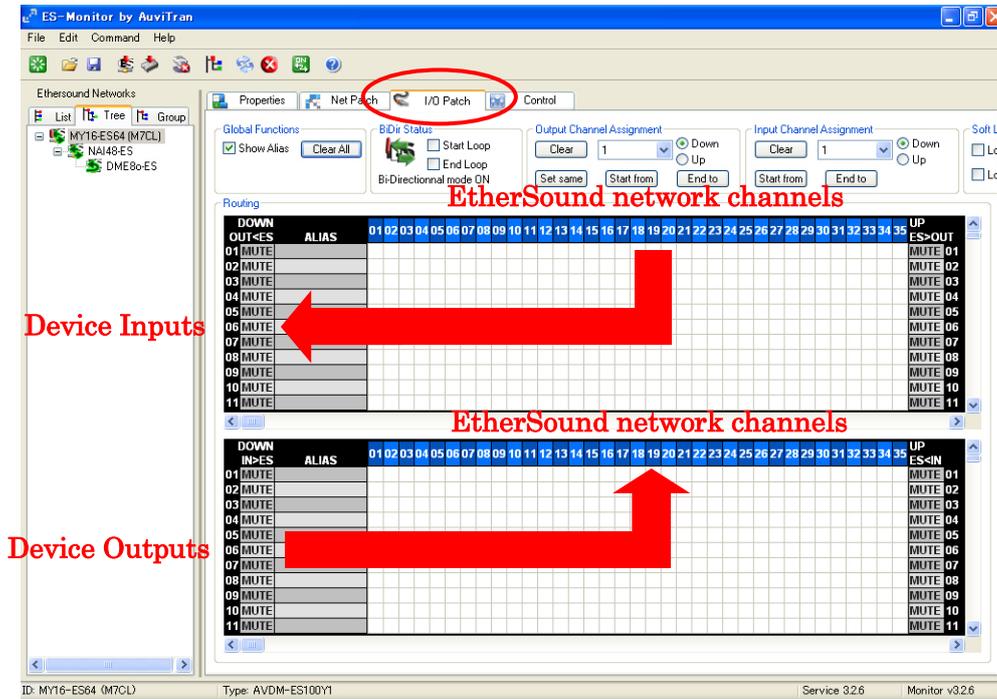
SOURCES are represented by columns and RECEIVERS are represented by rows. To connect a SOURCE to a RECEIVER, left click the appropriate square at the intersection of the row and column corresponding to the desired SOURCE and RECEIVER. By clicking on the **+** **-** boxes, you can expand or collapse groups of 16 channels at a time.

If any of dip switches of SB168-ES are ON (DOWN), the patch cannot be changed in Net Patch Mode. The patch can be edited in Net Patch Mode when all dip switches are OFF (UP).

(Dip switches are used for setting the patches automatically with the “Quick Setup” or “Auto Configure” function. For details, refer to page 52-54.)

I/O Patch View

In I/O Patch view, creating a patch requires two operations. First you must patch a transmitting device output to an EtherSound network channel, then patch the EtherSound network channel to a receiving device input. I/O Patch View requires more operations than Net Patch View, but allows you to specify the EtherSound network channel assigned to each patch. This is useful in cases where the same EtherSound network channels must carry different data on different segments of the network. See the side notes on “Overwriting Channels.”



A device’s outputs and inputs are represented by rows, and EtherSound network channels are represented by columns. To make audio patches, perform the following procedure:

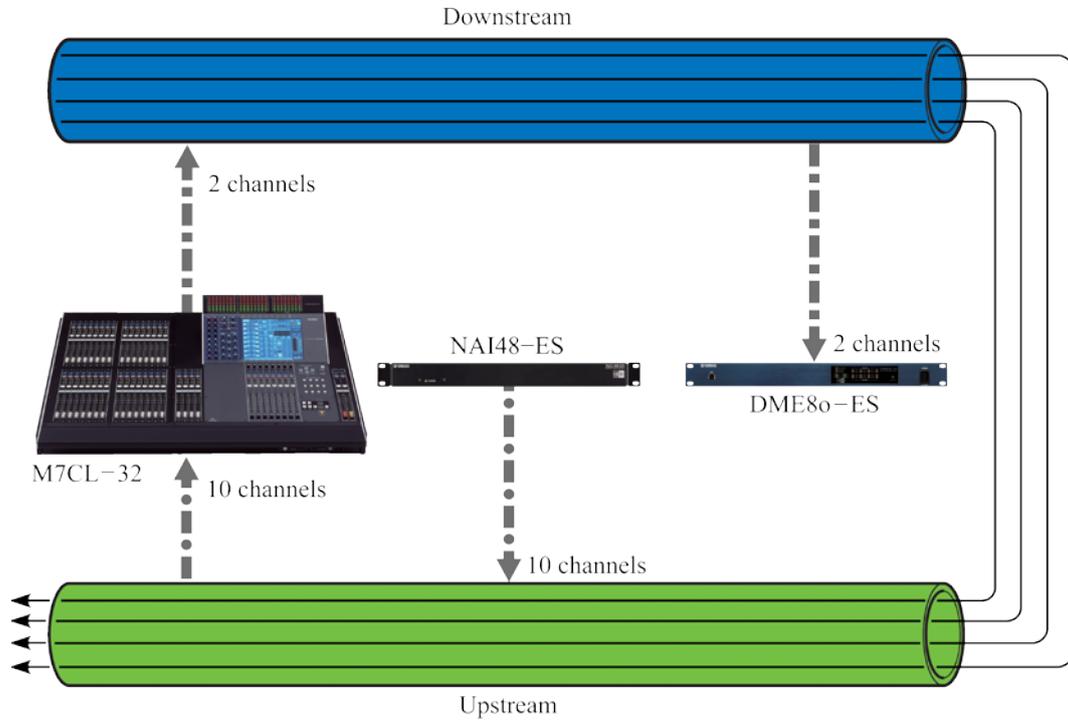
- ① In the lower box of I/O patch view of the transmitting device, click on the intersection of the transmitting device’s output and the desired EtherSound network channel.
- ② In the upper box of I/O patch view of the receiving device, click on the intersection of the EtherSound network channel of the above step, and the receiving device’s input.

Left clicking allocates a downstream channel ▼ and right clicking allocates an upstream channel ▲.

Step 5 Making Audio Patches

In this example, we will use I/O Patch view to make the following patches:

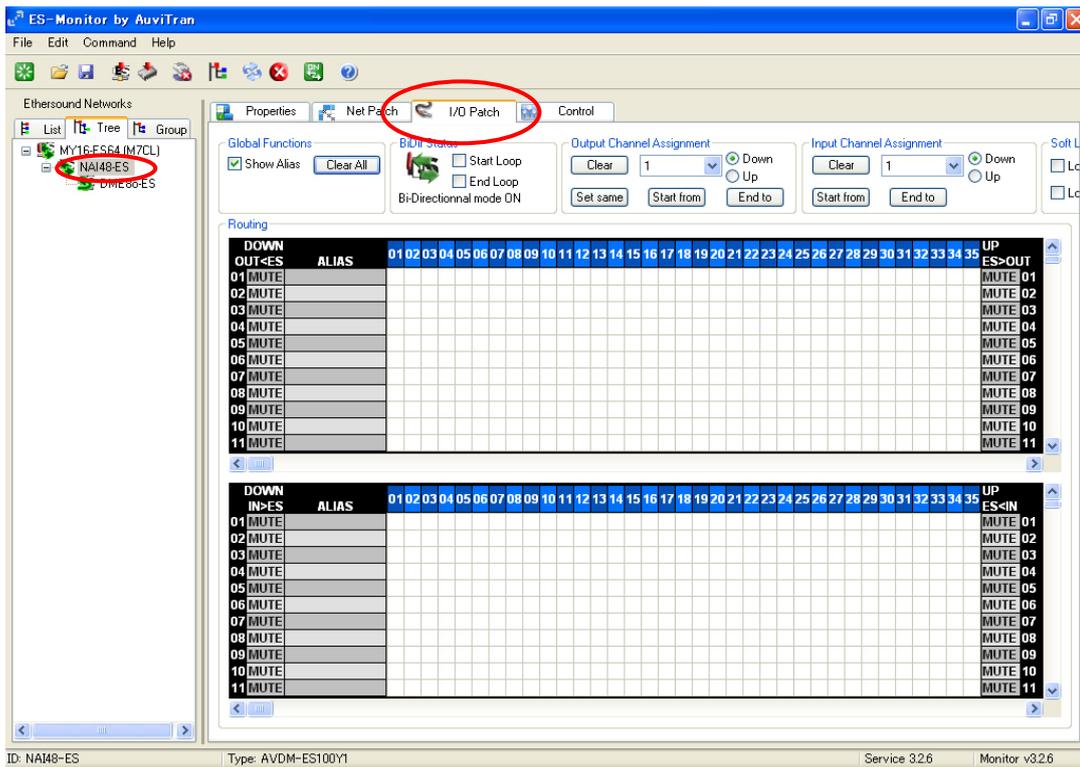
- ① Transmit 10 channels from NAI48-ES to M7CL (inputs from stage to FOH mixer)
- ② Transmit 2 channels from M7CL to DME80-ES (stereo mix for FOH speakers)



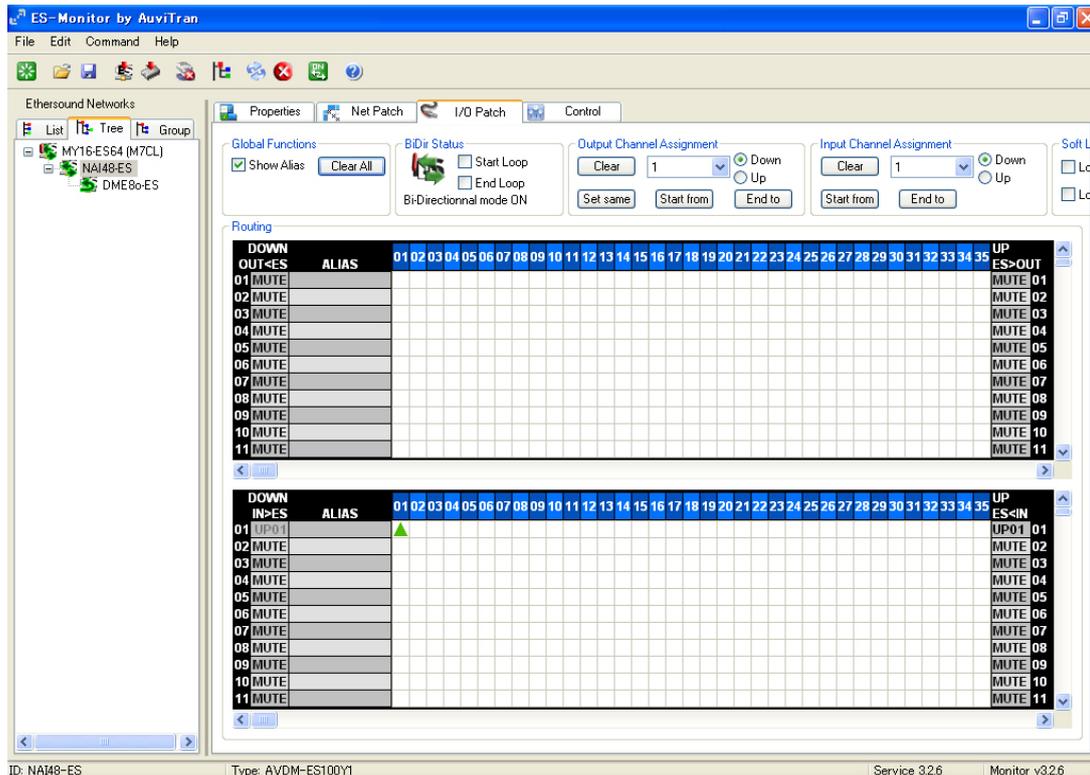
Step 5 Making Audio Patches

① Patching 10 channels from NAI48-ES to MY16-ES64 (M7CL)

First select NAI48-ES in the Tree view and select the I/O Patch tab.



Since MY16-ES64 is upstream from NAI48-ES, we will send on upstream EtherSound channels. In this example we will send data from NAI48-ES's device outputs 1~10 using upstream EtherSound channels 1~10. In the lower box, right click the intersection of the 1st row and the 1st column. A ▲ will appear to indicate that NAI48-ES output 1 has been assigned to upstream EtherSound channel 1.



Step 5 Making Audio Patches

Repeat this procedure for all 10 channels. When this is complete, I/O Patch View should appear as shown below.

The screenshot shows the I/O Patch View for the NAI48-ES network. The interface includes a menu bar (File, Edit, Command, Help), a toolbar, and a main window with several tabs: Properties, Net Patch, I/O Patch, and Control. The I/O Patch tab is active, displaying two routing tables. The top table, labeled 'DOWN OUT<ES', shows 11 channels (01-11) all set to 'MUTE'. The bottom table, labeled 'DOWN IN>ES', shows 11 channels (01-11) with a diagonal line of green triangles indicating a patch from channel 01 to 01, 02 to 02, etc., up to 11 to 11. The status bar at the bottom indicates 'ID: NAI48-ES', 'Type: AVDM-ES100Y1', 'Service 3.2.6', and 'Monitor v3.2.6'.

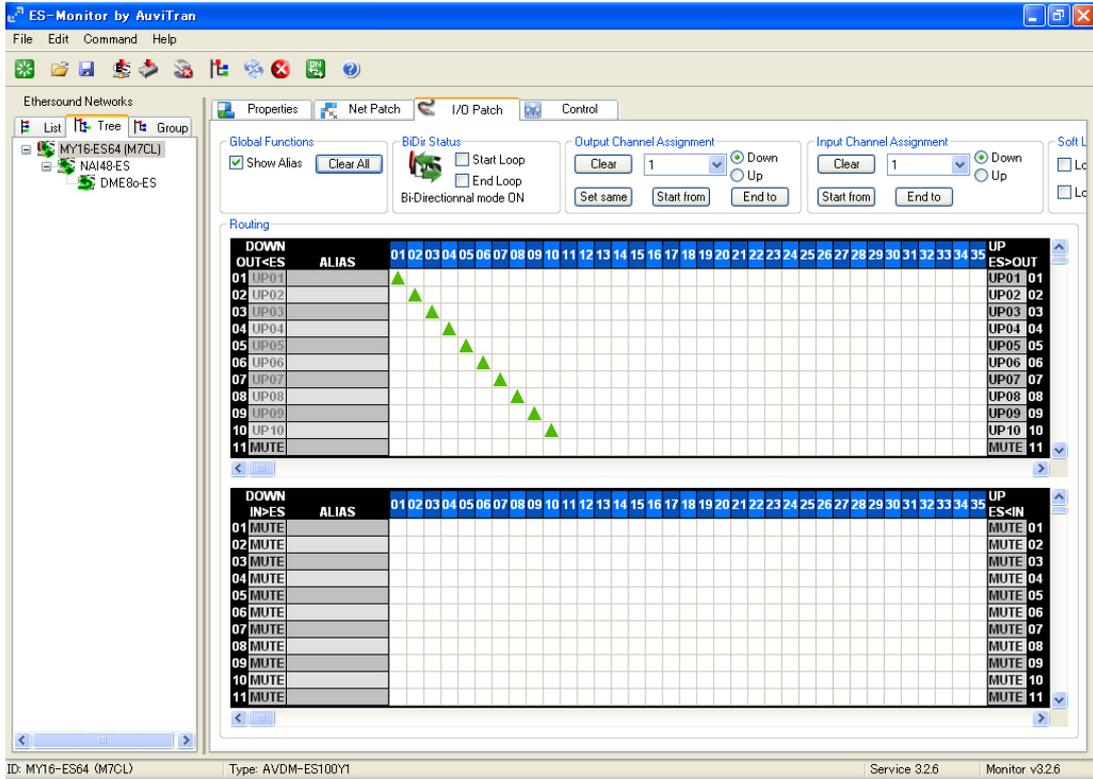
Now 10 channels of audio from NAI48-ES have been sent to the EtherSound network.

Next select MY16-ES64 (M7CL) in Tree view.

The screenshot shows the I/O Patch View for the MY16-ES64 (M7CL) network. The 'Ethersound Networks' tree view on the left has 'MY16-ES64 (M7CL)' selected and circled in red. The main window shows the same I/O Patch interface as the previous screenshot, but with the routing tables currently empty. The status bar at the bottom indicates 'ID: MY16-ES64 (M7CL)', 'Type: AVDM-ES100Y1', 'Service 3.2.6', and 'Monitor v3.2.6'.

Step 5 Making Audio Patches

We will now receive the upstream audio channels 1~10 transmitted by NAI48-ES on MY16-ES64 inputs 1~10. In the upper box, right click the intersections of the 1st row and 1st column to the 10th row and 10th column.

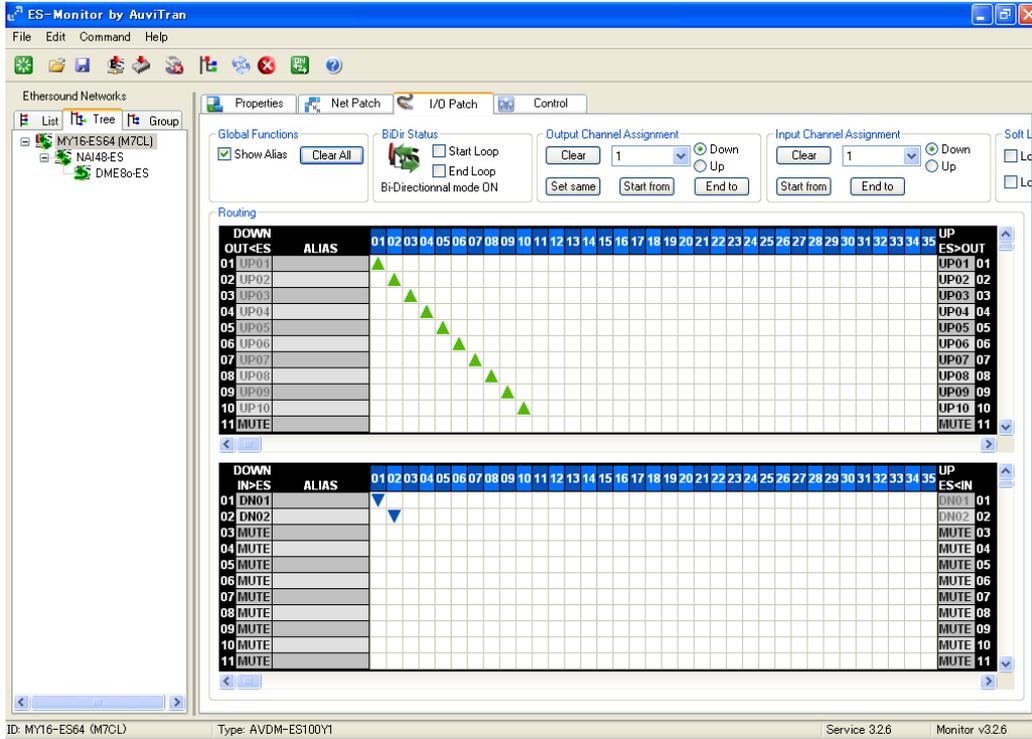


Now 10 channels of audio from NAI48-ES pass through the EtherSound network and are received by MY16-ES64.

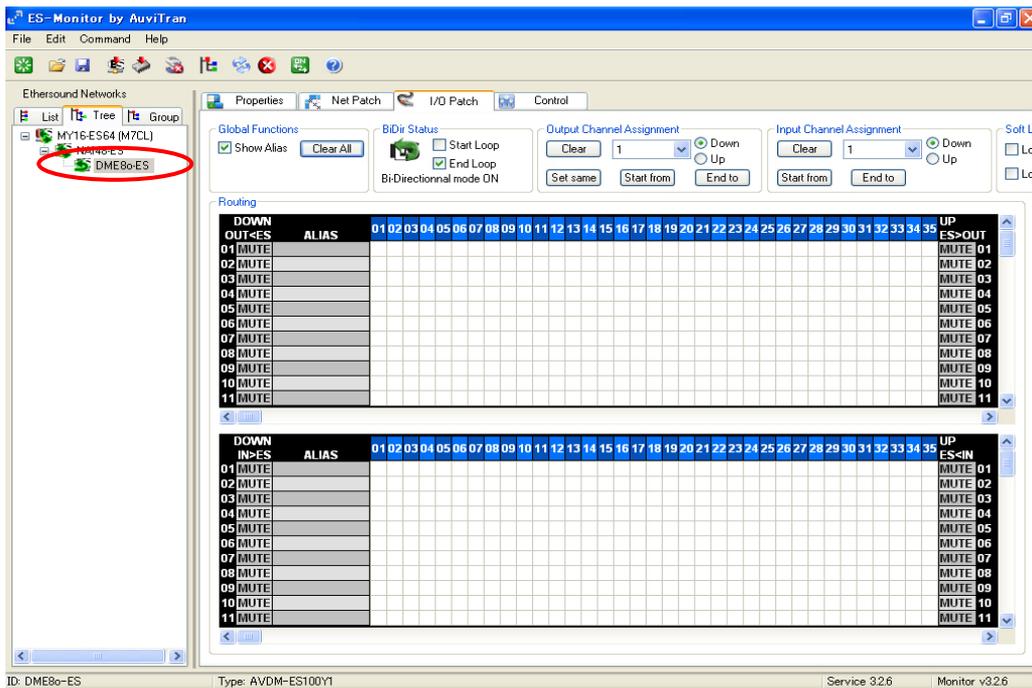
Step 5 Making Audio Patches

② Patching 2 channels from MY16-ES64 (M7CL) to DME80-ES

Since DME80-ES is downstream from MY16-ES64 (M7CL), we will transmit on downstream channels. We will send data from MY16-ES64 (M7CL)'s outputs 1~2 using downstream EtherSound channels 1~2. In the lower box, left click the intersection of the 1st row with the 1st column, and the 2nd row with the 2nd column. A ▼ pointing downwards will appear to indicate that MY16-ES64 (M7CL) output 1~2 has been assigned to downstream EtherSound channels 1~2.

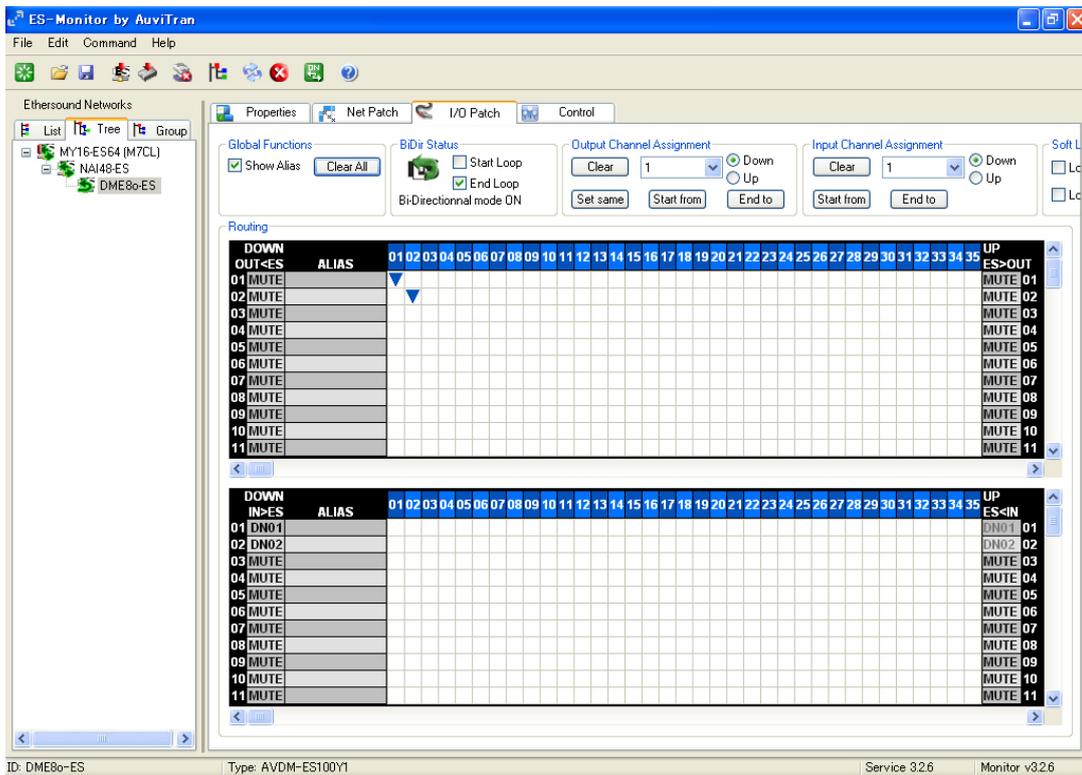


Next select DME80-ES in Tree View.



Step 5 Making Audio Patches

In the upper box, left click the intersections of the 1st row and 1st column and the 2nd row and 2nd column to receive the downstream audio channels 1~2 transmitted by MY16-ES64 (M7CL) on DME8o-ES inputs 1~2.

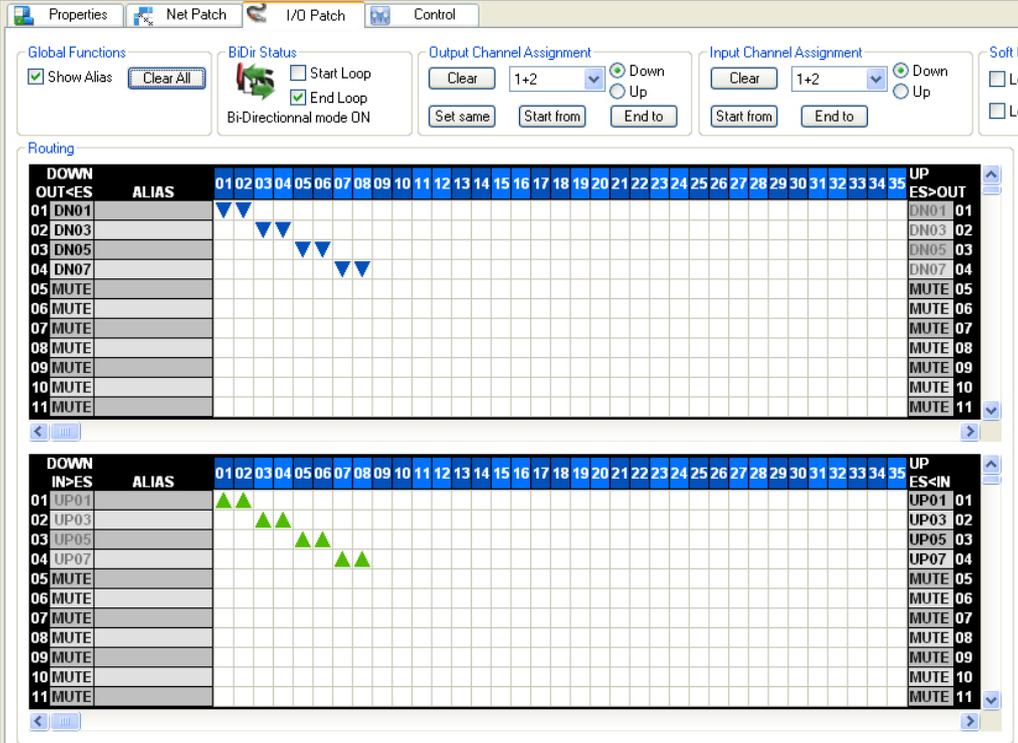


Now 2 channels of audio from MY16-ES64 pass through the EtherSound network and are received by DME8o-ES.

This completes patching for our example.

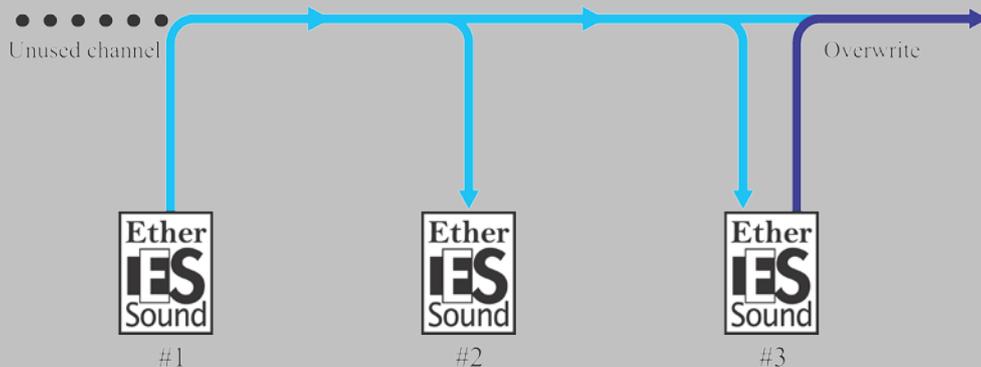
Audio Patches When Using 96 kHz

In I/O patch view, when using 88.2 or 96 kHz sampling frequency, two EtherSound channels are used to transmit one audio channel. When a column is selected, two adjacent columns will be selected automatically.



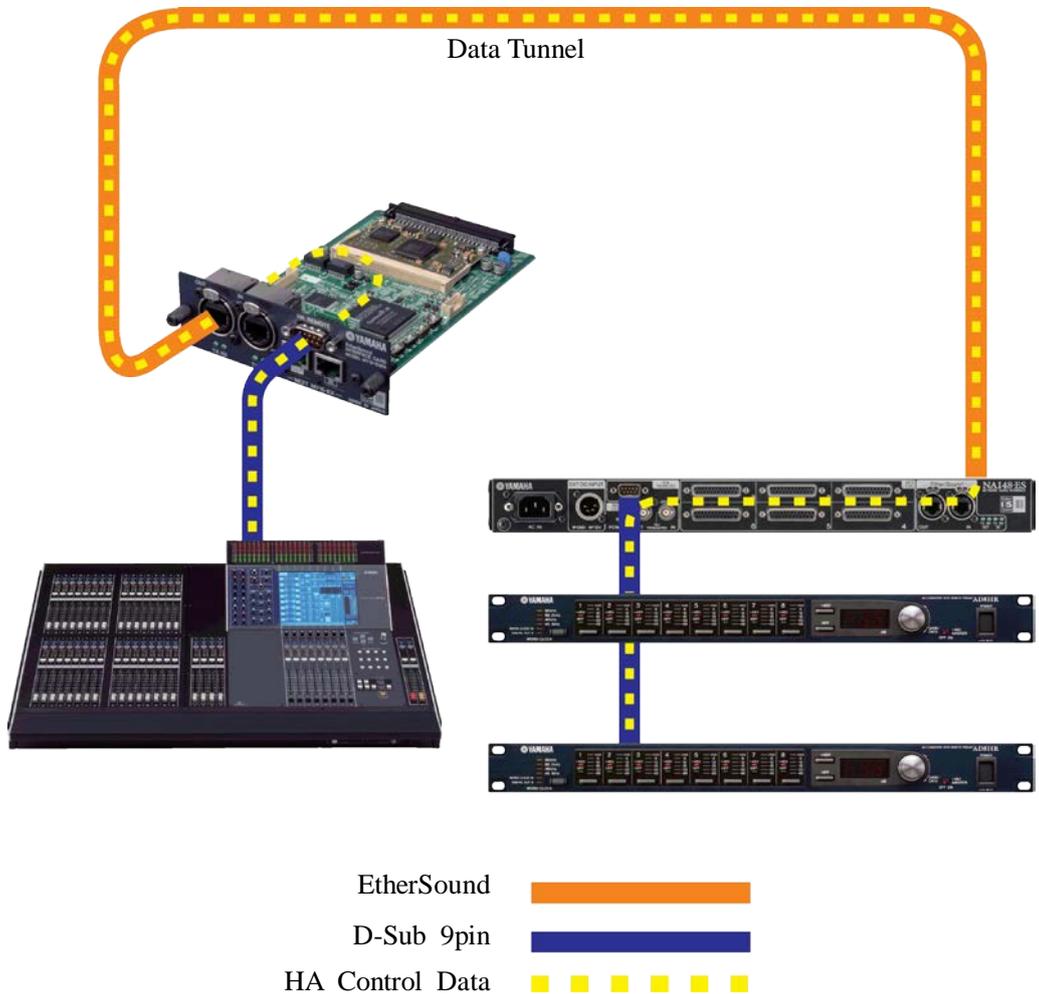
Overwriting Channels

An EtherSound device may transmit data onto any EtherSound channel regardless of whether the channel is in use or not. Transmitting audio data onto an EtherSound channel already in use is called overwriting. In the example below, after receiving audio data on a given EtherSound channel, device #3 overwrites that channel with different audio data. Overwriting allows you to have more than 64 independent audio data channels. For Ring Topologies, overwriting is prohibited.



Step 6 Remote Head Amp Control

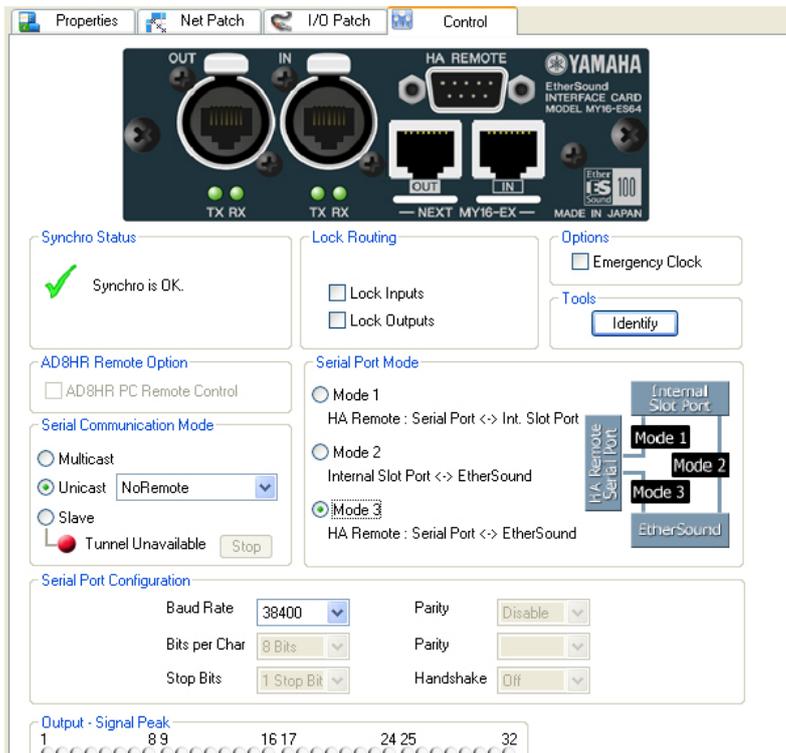
Remotely controllable head amp units may be controlled using EtherSound's Data Tunneling capabilities.



In our example system, we will configure a data tunnel between MY16-ES64 (M7CL) (controlling device), and NAI48-ES (receiving device).

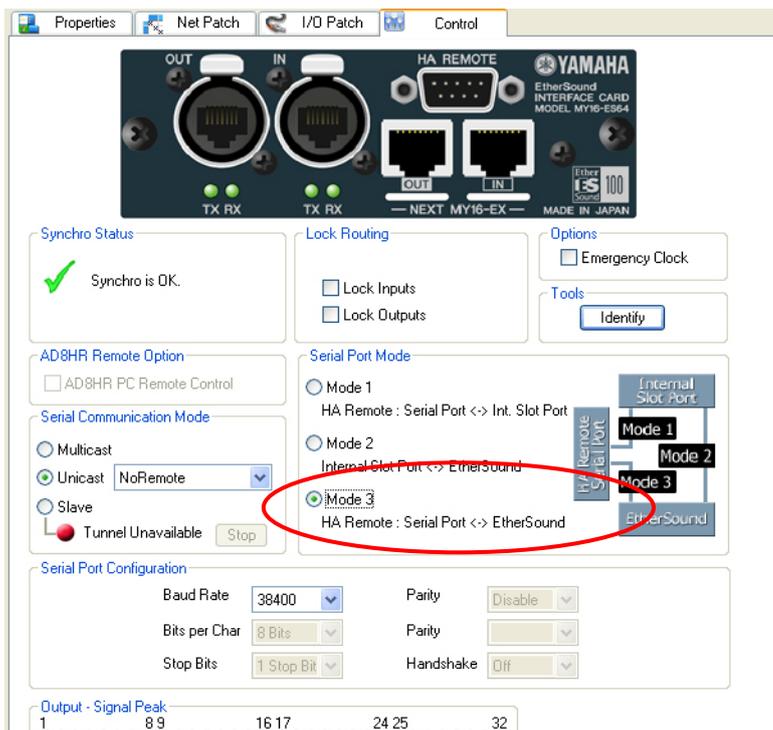
■ **Setting up MY16-ES64 (M7CL) (controlling device)**

Select MY16-ES64 (M7CL) in Tree view or List view and select the control tab.



Serial Port Mode

The Serial Port Mode will depend on the host device of the MY16-ES64. This example uses M7CL. Since M7CL uses its REMOTE port to output control data, select Mode 3. See the next side notes.

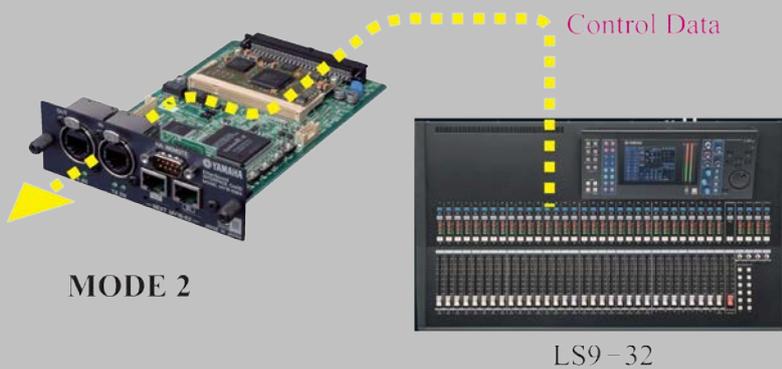


MY card Serial Port Mode

For a host device that outputs control data from via its REMOTE port select Mode 3.



For a host device capable of outputting control data via its internal slot, select Mode 2.



The Serial Port Mode setting for various Yamaha digital mixers is given in the table below.

Model	Serial Port Mode
PM1D	NA
PM5D	Mode 3
M7CL	Mode 3
LS9 (*)	Mode 2
DM1000, DM2000	Mode 3
01V96	NA
02R96	NA
DME64N/24N	Mode 3
DME Satellite series	NA

(*): If you use the LS9-32 as the host device of the MY16-ES64, remote head amp control can be made via slot 1 only.

Remote Head Amp Control Setup for LS9-32

Press the [RACK5-8] key to access the EXTERNAL HA screen.



In the COMM PORT box, select “SLOT1” as the communication port for the MY16-ES64 card. (When using LS9-16, select “SLOT”.)



Specify the input ports for an external HA.

Move the cursor to the EXTERNAL HA PORT SELECT popup button for each head amp unit, and press the ENTER key.

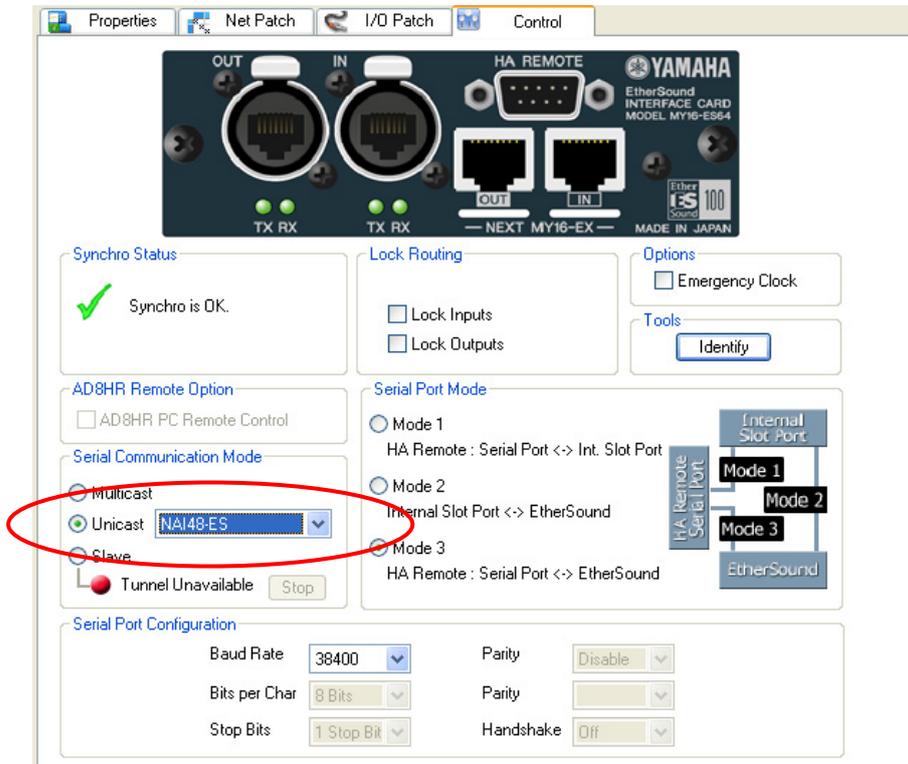
In the EXTERNAL HA PORT SELECT popup window, use the PORT SELECT button to specify the input ports to which the audio output of the external HA is connected.

Starting from the head amp with ID#1, specify the input ports in the order SLOT1 1-8, SLOT1 9-16, SLOT2 1-8, SLOT2 9-16. (In the case of LS9-16, specify the input ports in the order SLOT1 1-8, SLOT1 9-16.)



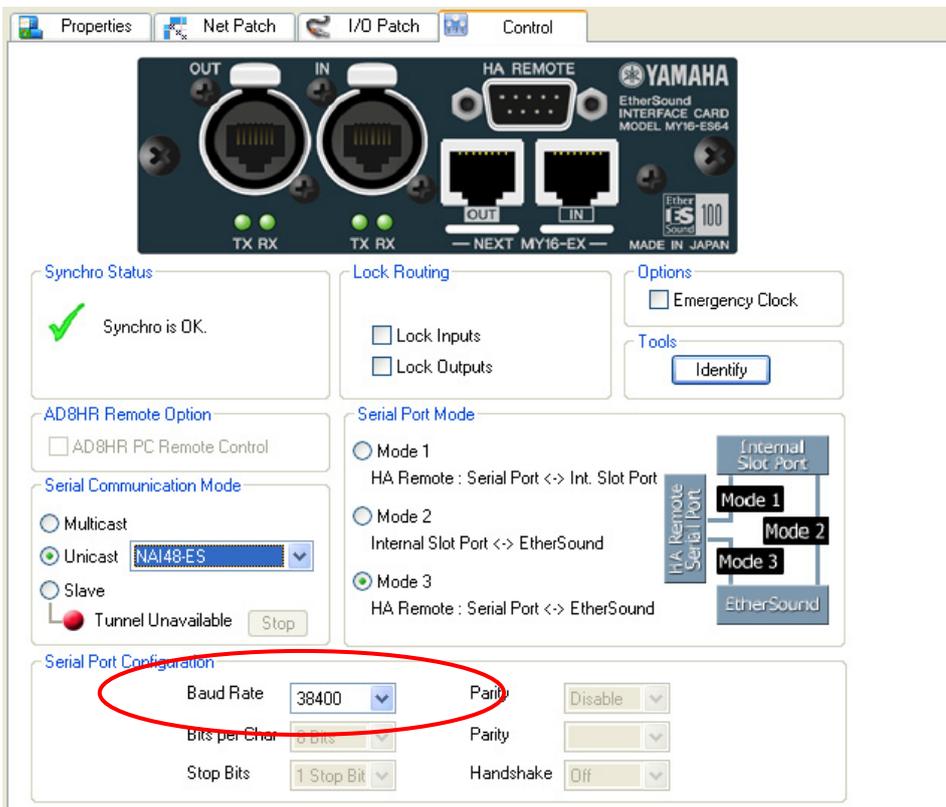
Serial Communication Mode

Set the Serial Communication Mode to Unicast. Since the head amps requiring control are connected to NAI48-ES, in the list box, select NAI48-ES.



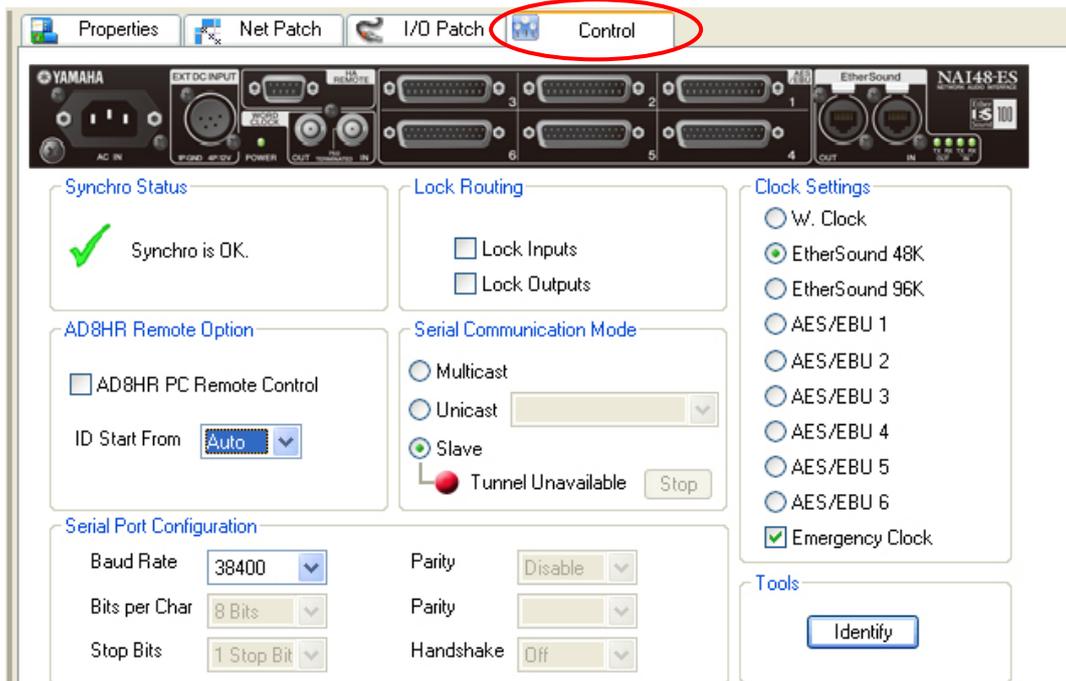
Serial Port Configuration

Set the Baud Rate to 38400.



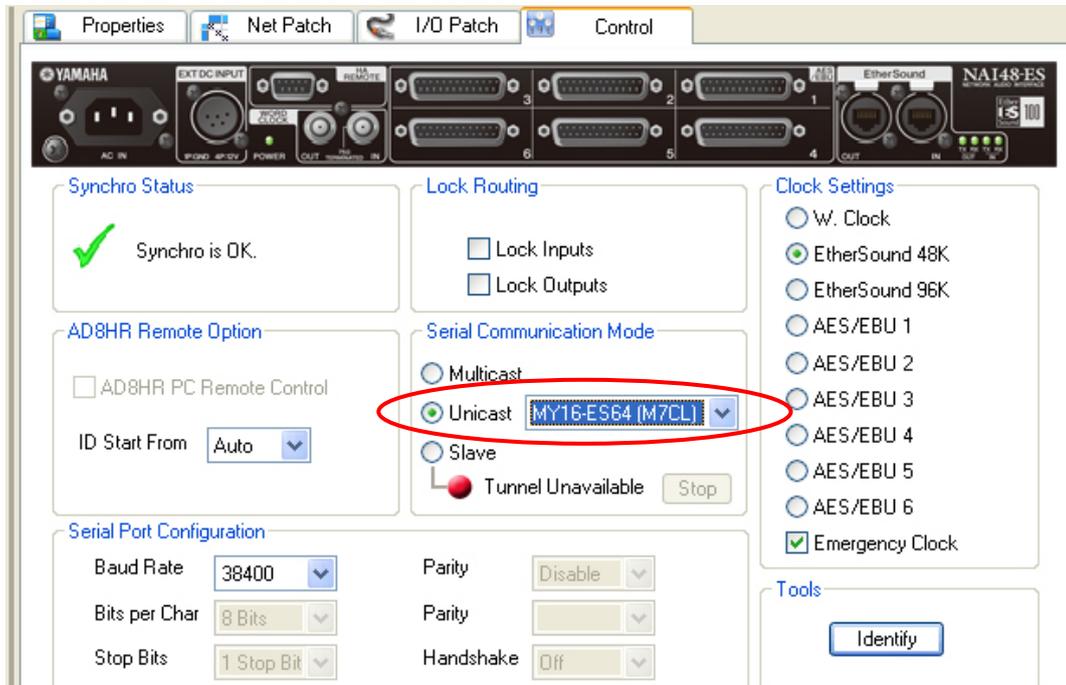
■ **Setting up NAI48-ES (receiving device)**

Select NAI48-ES in Tree view or List view and select the Control tab.



Serial Communication Mode

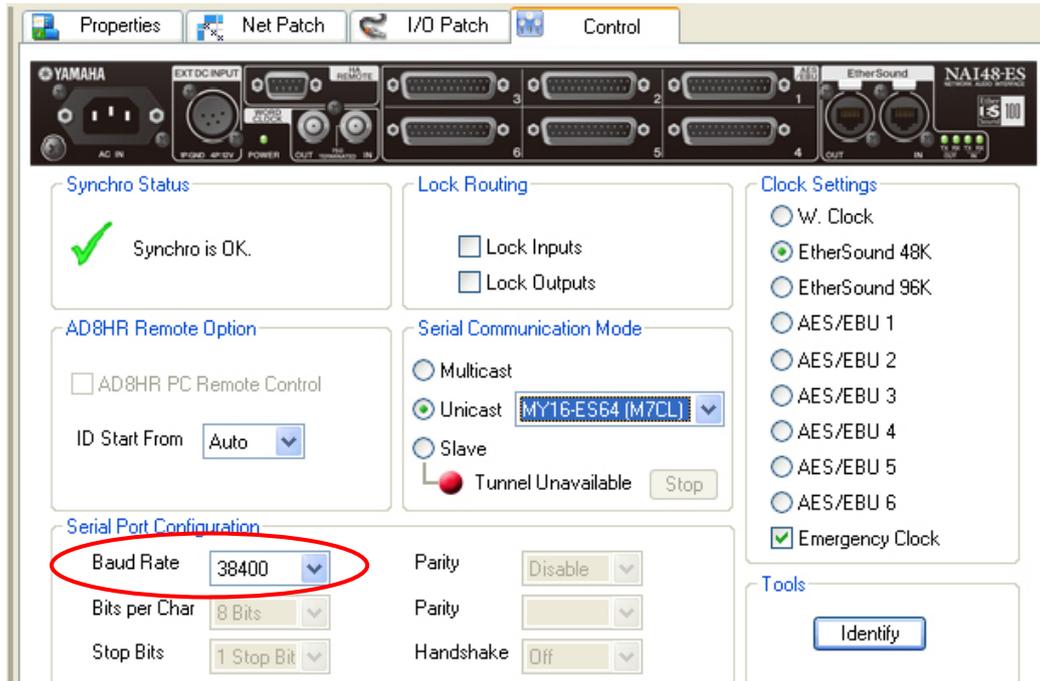
Set the Serial Communication Mode to Unicast and select MY16-ES64 as the destination.



Note: Multicast is not used with Yamaha products. When AVS-Monitor is used to control the Head Amp directly, select “Slave”.

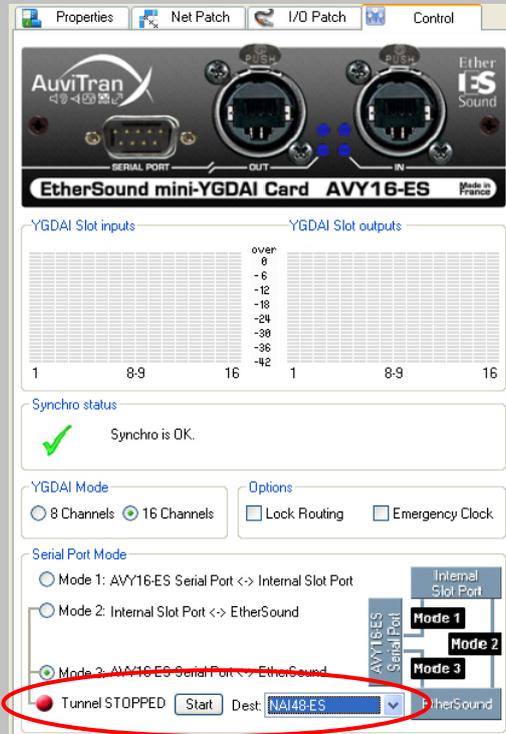
Serial Port Configuration

Set the Baud Rate to 38400.

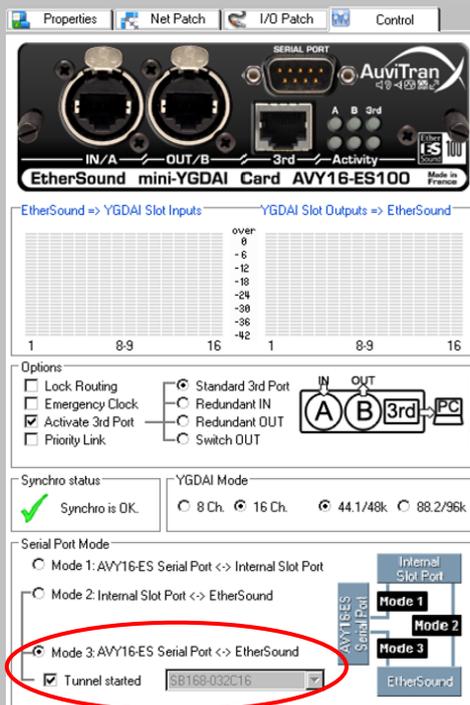


Head Amp Control with AVY16-ES / AVY16-ES100

When controlling head amps with AVY16-ES, AVY16-ES must be the Primary Master. Select the destination device and press Start button as shown in the diagram below, In the control tab of the receiving device, select "Slave" as the Serial Communication Mode. When using AVY16-ES, there can be only one receiving device on the entire system.

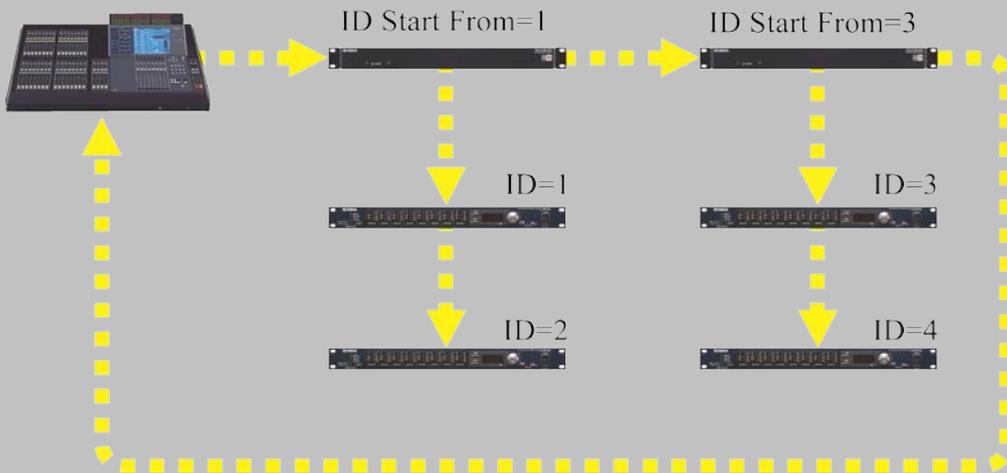


When using AVY16-ES100, as with Yamaha's MY16-ES64, Unicast is used as the Serial Communication Mode, and there can be multiple receiving devices on the system. (Refer to the next page for details.)

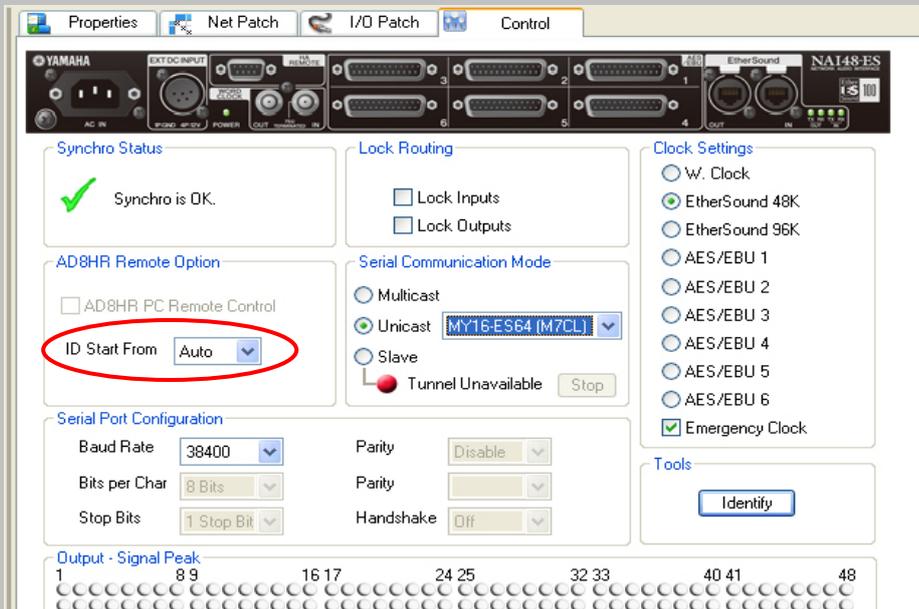


Head Amp Control with Multiple NAI48-ES

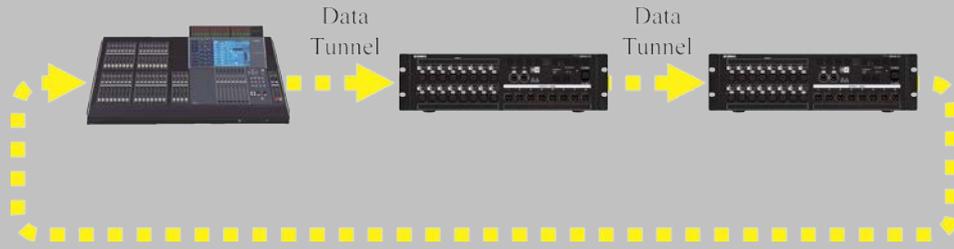
When controlling multiple NAI48-ES units, ensure that each AD8HR on the system has a unique ID by using the ID Start From parameter.



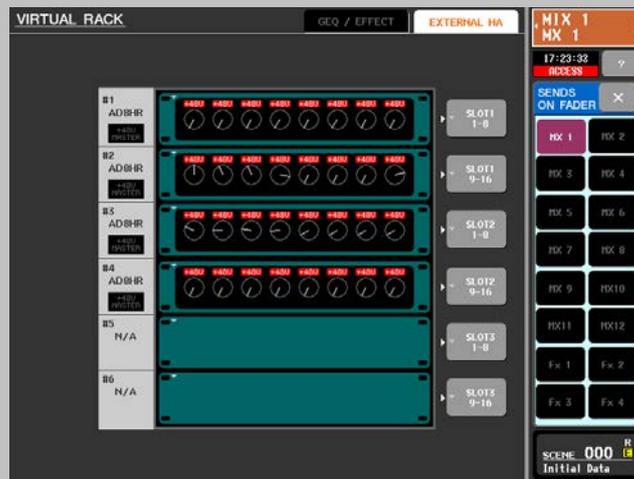
AD8HRs connected to the same NAI48-ES will be assigned consecutive IDs. The “ID Start From” parameter determines the ID of the first AD8HR unit. Up to eight AD8HR units may be used on the entire network.



Head Amp Control with SB168-ES



When remotely controlling SB168-ES units, the 16 internal head amps of SB168-ES will appear as two AD8HR units in the console's display.



AD8HR IDs will be assigned automatically in the following manner:

- 1st SB168-ES unit in unicast chain channel 1~8: AD8HR ID 1
- 1st SB168-ES unit in unicast chain channel 9~16: AD8HR ID 2
- 2nd SB168-ES unit in unicast chain channel 1~8: AD8HR ID 3
- 2nd SB168-ES unit in unicast chain channel 9~16: AD8HR ID 4

Note: When remotely controlling both SB168-ES and NAI48-ES units on the same system, always place NAI48-ES units first in the unicast control chain.

For example, a system having one NAI48-ES and two SB168-ESs, the order of devices in the unicast chain should be as follows:

MY16-ES64 >> NAI48-ES >> SB168-ES #1 >> SB168-ES #2

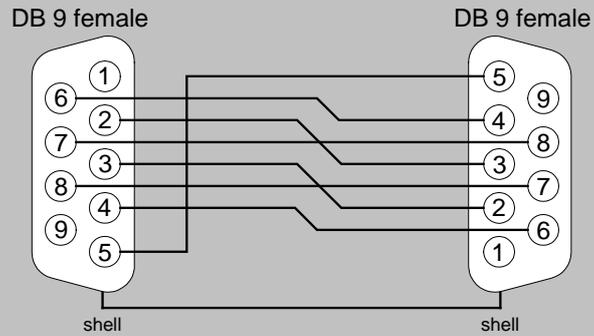
The order of the unicast chain refers to the order in which devices are specified in AVS-Monitor and not the order in which devices are physically connected.

Since the IDs of SB168-ES head amps are automatically assigned in order of connection from #1, the ID Start From parameter of NAI48-ES unit must be set so that the IDs of AD8HR units connected to NAI48-ES follow the last ID assigned to the last SB168-ES.

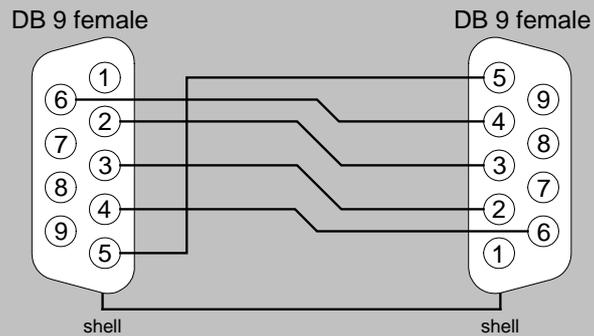
(In the case of example above, set the ID Start From parameter of NAI48-ES to 5 because two SB168-ES units are displayed as four AD8HR units (ID#1~4).

D-Sub 9pin Cables for Head Amp Control

When controlling head amps with Yamaha devices such as AD8HR, MY16-ES64, NAI48-ES, PM5D, M7CL-48/32, DM2000, DM1000 and DME series, or AuviTran's AVY16-ES100 card, be sure to use a D-sub 9pin (female) crossover cable with pin assignment shown below.



When controlling head amps with AVY16-ES card, be sure to use a D-sub 9pin (female) crossover cable with pin assignment shown below.



Step 7 Making the System Redundant

Cable redundancy can be added to the system by using EtherSound's Fault Tolerant Ring Mode.

However, when using this mode, there are certain restrictions to observe.

Patching Restrictions

A special patching scheme which ensures patches continue to work after cable failures must be used.

Specifically:

- End Loop parameters for all devices must be set to "ON"
- Audio must be transmitted on downstream channels only.
- Audio must be received on upstream channels only.
- Overwriting of channels is not permitted.

This patching scheme effectively limits the total number of EtherSound network channels to 64.

Wordclock Restrictions

- All devices must be configured to receive wordclock from the EtherSound network.
Devices connecting to the EtherSound network via MY cards must synchronize to the card slot containing the EtherSound card. An external or "House" clock cannot be used.
- Sample rate can only be multiples of 48kHz. (48 kHz or 96kHz)
- Emergency clock must be "ON" for all devices.

Other Restrictions

The Preferred Primary Master device must be ES100 compatible. ES100 compatible devices bear the logo below.



Step 7 Making the System Redundant

We will now explain the procedure for making our daisy chain system redundant.

Wordclock Source settings

Since all devices must be configured as non-primary master devices, we must change the wordclock settings for MY16-ES64.

Referring to the section on wordclock settings for MY16-ES64, the clock setting of the host device (M7CL) for non-Primary Master devices must be set to the slot containing MY16-ES64.



Emergency Clock settings

For all devices we must check the Emergency Clock check box.

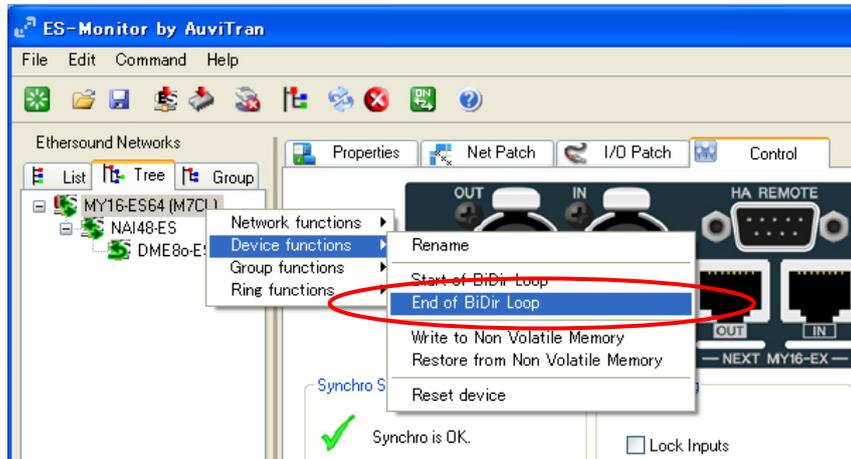


In the event of a cable failure, this clock is used during the interval until a new wordclock master is established.

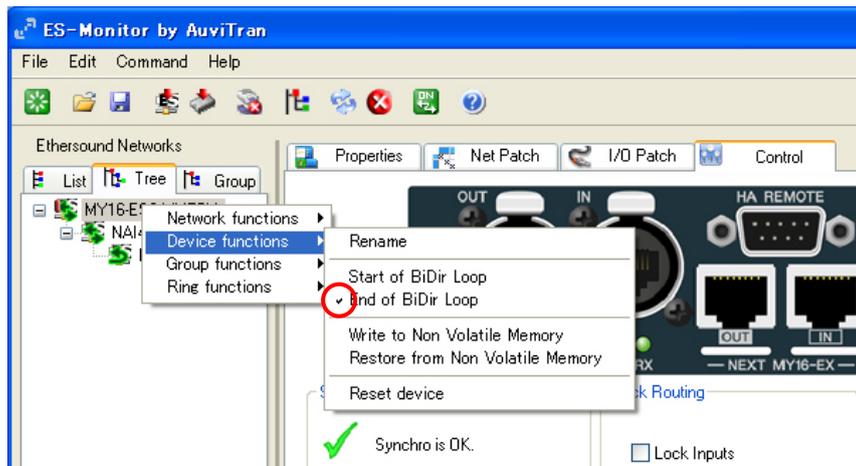
End Loop settings

End Loop settings must be turned on, for all devices. End Loop is already set for DME80-ES. Repeat the following procedure for MY16-ES64 (M7CL) and NAI48-ES.

- ① In Tree view, right click the device name and move the mouse to highlight “Device functions” as “End of BiDir Loop”.
- ② Release the mouse to toggle the parameter’s state.



A check mark to the left of “End of BiDir Loop” appears to indicate that the parameter is active.

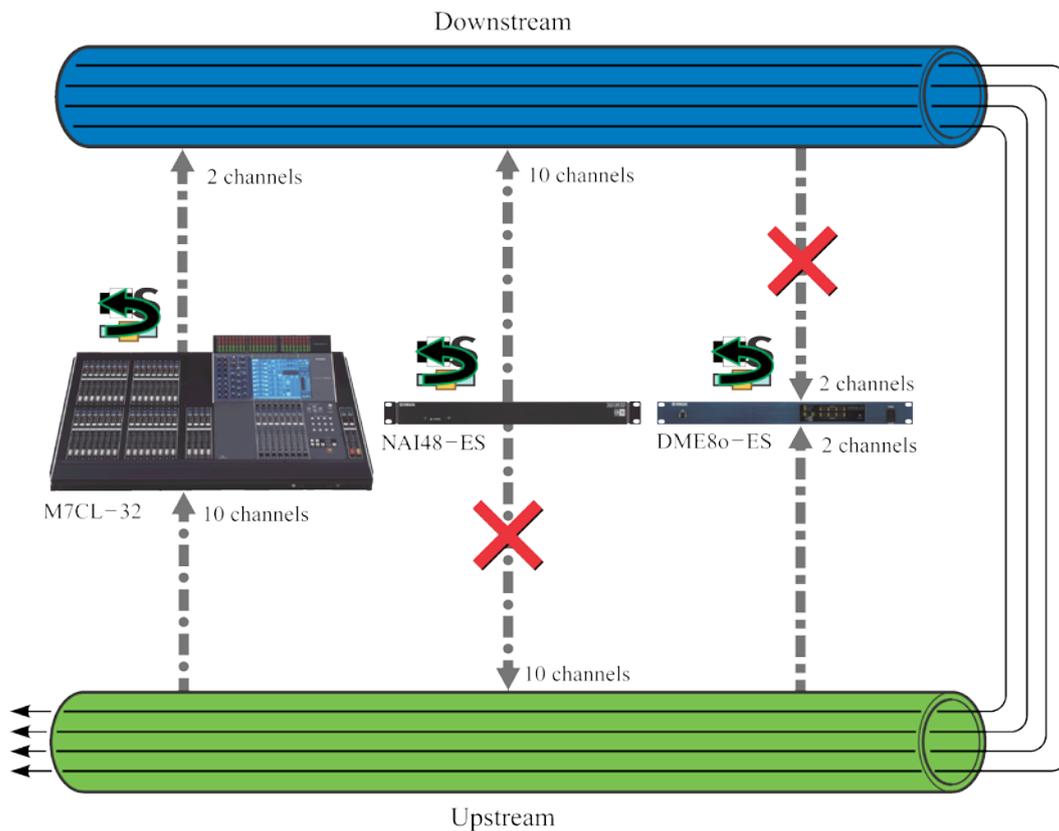


Audio Patches

For patches to continue to work after cable failures, we must make sure that transmission takes place only on downstream channels and reception takes place only on upstream channels.

In this example, we will make the following repatches.

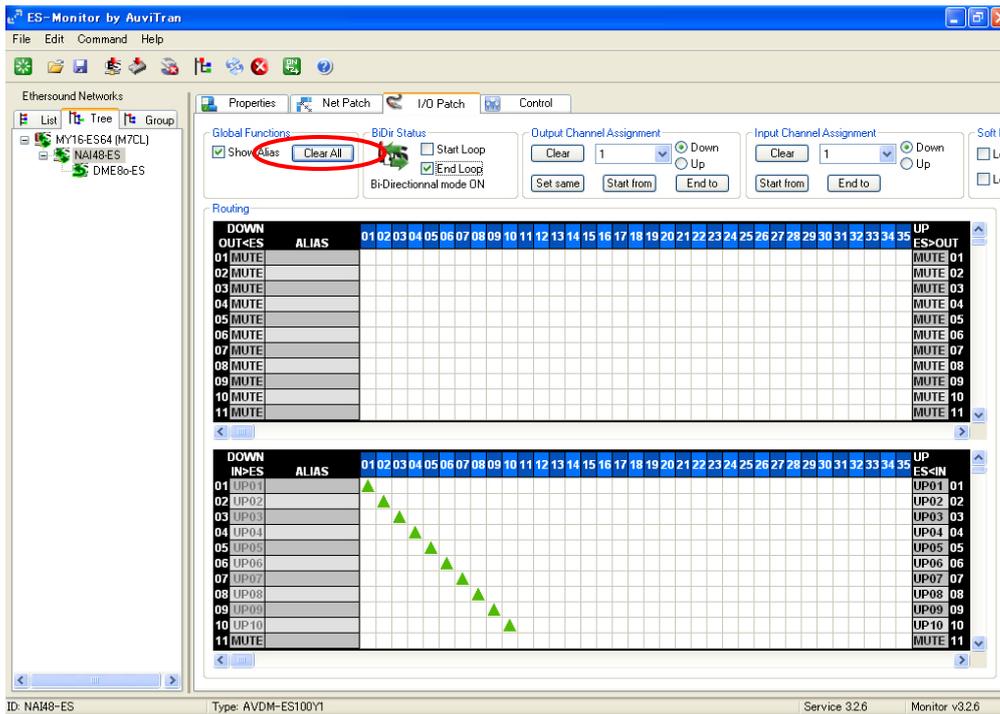
- ① Transmit 10 channels from NAI48-ES to M7CL on DOWNSTREAM
- ② Transmit 2 channels from M7CL to DME80-ES on UPSTREAM



Step 7 Making the System Redundant

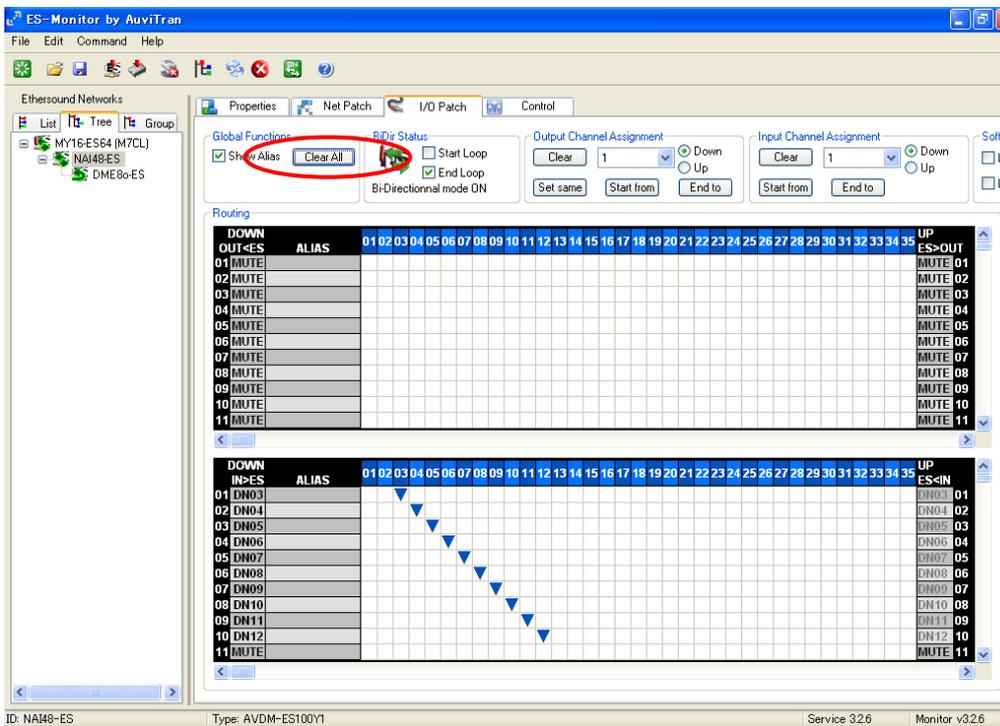
① Repatching 10 channels from NAI48-ES to MY16-ES64 (M7CL)

Select NAI48-ES in Tree view:



We must reconfigure NAI48-ES so that it transmits on downstream channels.

Press the “Clear All” button to clear current patches. Since downstream EtherSound channels 1 and 2, are already in use by MY16-ES64 (M7CL), configure NAI48-ES to transmit on downstream EtherSound channels 3~12 to avoid conflicts. Use the same procedure given in Step 5.

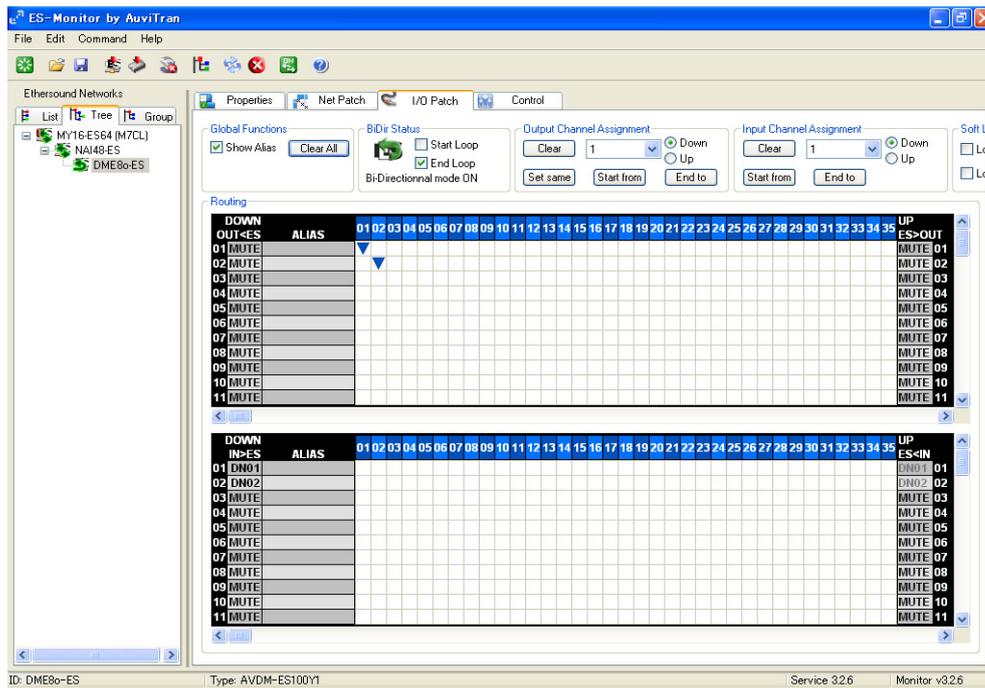


Now 10 channels of audio from NAI48-ES have been sent on downstream EtherSound channels 3~12.

Step 7 Making the System Redundant

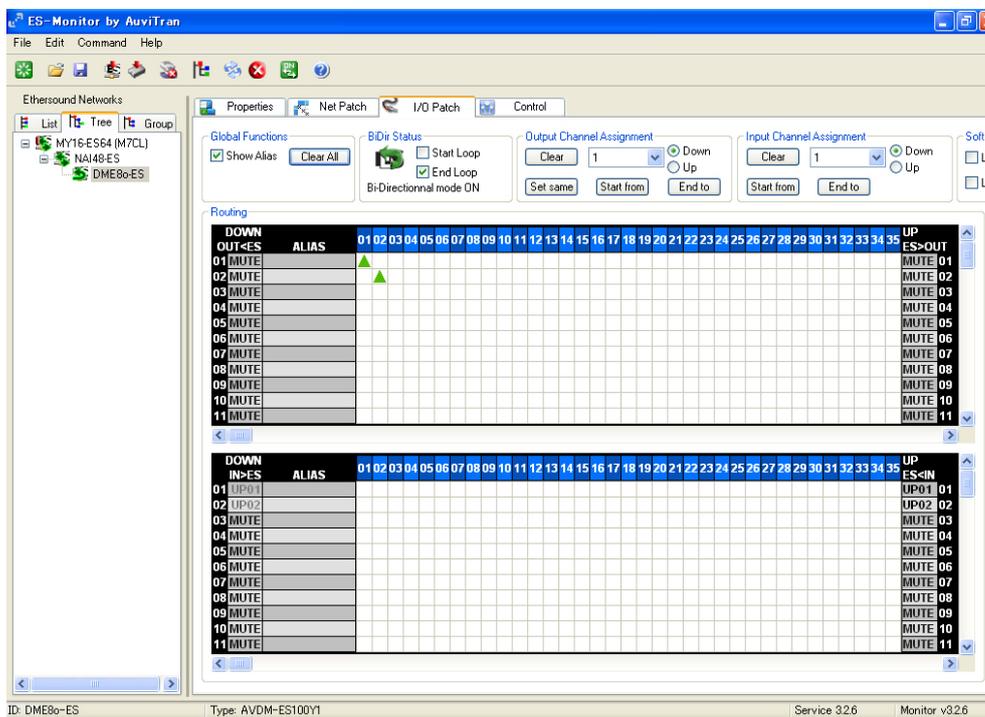
② Repatching 2 channels from M7CL to DME8o-ES

Select DME8o-ES in Tree view.



In Step 5 we configured DME8o-ES to receive on downstream EtherSound channels 1 and 2. However, since all channels are looped back, we can receive the same data on upstream EtherSound channels 1 and 2.

Right click on the previous patches to change the patches to upstream channels.

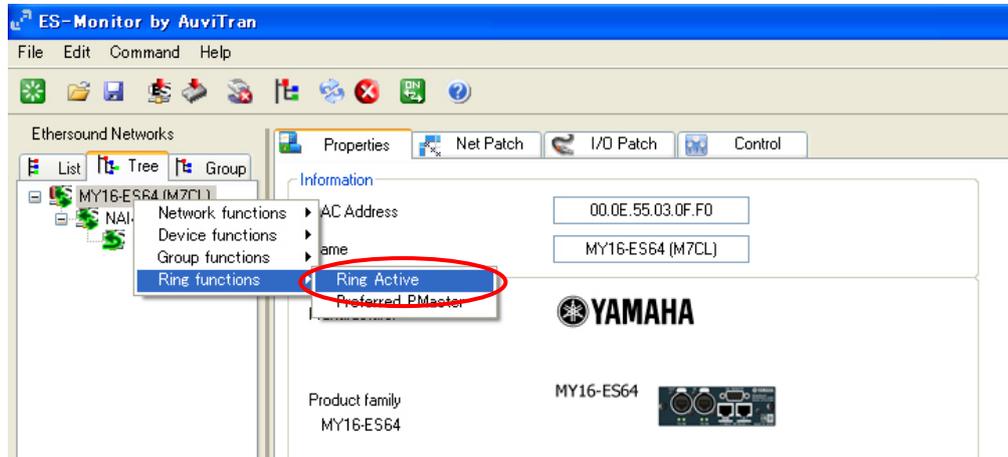


Tip: The above section describes ring topology patching with the purpose of emphasizing the differences between ring and daisy chain configurations.

A more practical approach is to first set “Ring Active” and then repatch using NetPatch view or I/O Patch view. When Ring Active is set first, AVS-Monitor will display error messages when the user attempts to create patches which are not permitted in ring topologies.

Selection of Preferred Primary Master and Ring Active setting

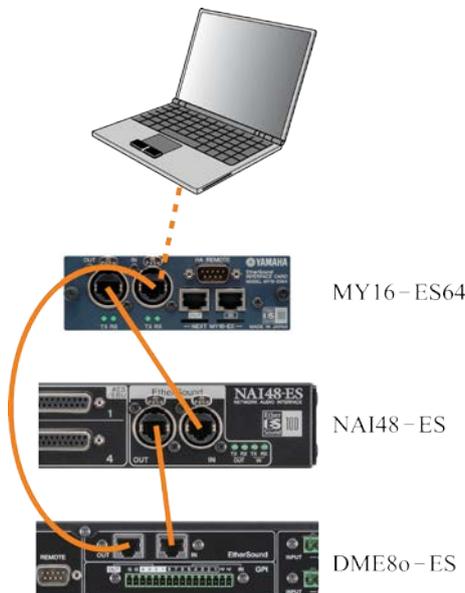
In a daisy chain EtherSound network, the device supplying wordclock is always the Primary Master device (the first device in the chain). In Fault Tolerant Ring Mode, since there is no “first” device, a wordclock master must be specified by the user. This device is called the “**Preferred Primary Master.**” In the Tree view, right click on the device you wish to select as the preferred primary master. Move the cursor to Ring Functions >> Ring Active as shown below.



This sets the device as preferred primary master and puts the network in ring mode.

Closing the Loop

If the system consists of only two EtherSound network port devices (such as in our example), the PC must be removed to close the loop. Remove the PC and connect the OUT port of the last device in the chain (DME8o-ES) to the IN port of the MY16-ES64.



Monitoring of Ring Networks

If you require continuous monitoring of the network by AVS-Monitor, there must be at least one 3 port device on the network.

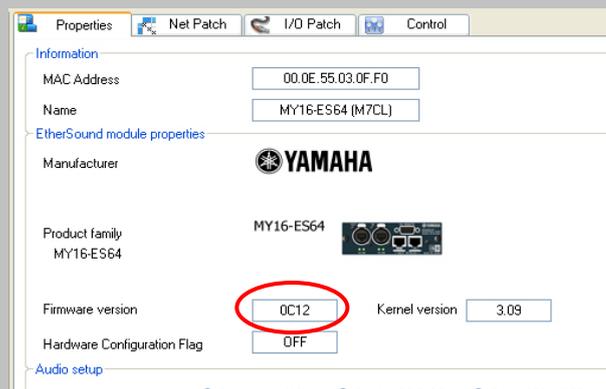
Step 7 Making the System Redundant

Wordclock for Ring Topologies

For ring topologies, the device for which the user sets Ring Active becomes the Preferred Primary Master and assumes the role of wordclock master. In the event of a cable failure, the network reverts to a daisy chain network. In this case, the wordclock master device automatically switches from the Preferred Primary Master to Primary Master, the device at the start of the daisy chain. From the moment of ring failure until wordclock switchover is complete, to avoid audio interruptions, all devices must be configured to receive wordclock not from internal oscillators or external sources but from the EtherSound network. Also, all devices should have their Emergency Clock set to ON.

AuviTran Firmware for Ring Topologies

Before connecting devices in a Ring Topology, make sure that AuviTran firmware version “C0F” or greater is running on all Yamaha EtherSound devices. The AuviTran firmware version can be checked in the AVS-Monitor Properties tab.



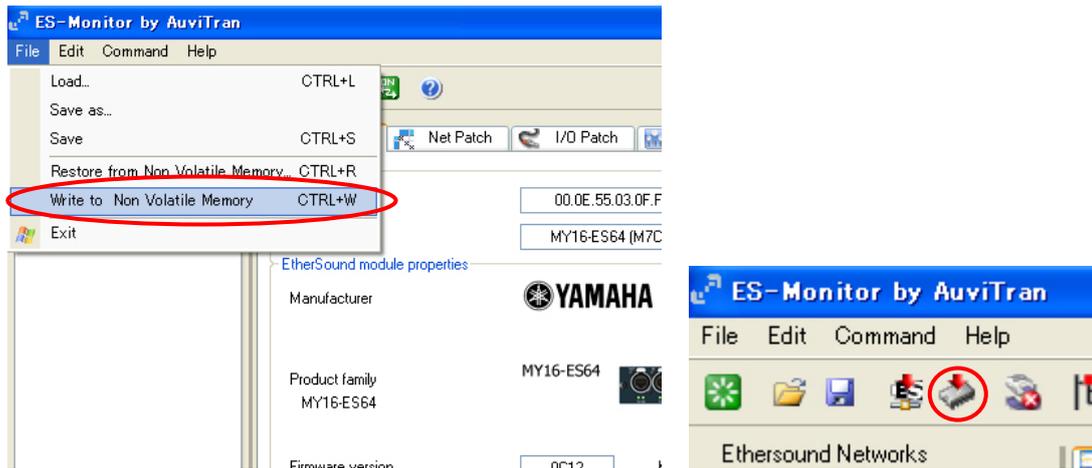
Note: The AuviTran firmware version number uses the hexadecimal (base 16) numbering system. The symbols 0 through 9 to represent values zero to nine, and A through F to represent values ten to fifteen. C0F < C10 < C11 < C12 ...etc.

Step 8 Saving your Configuration

All EtherSound device settings with the exception of device names can be committed to non-volatile memory, eliminating the need for reconfiguration each time the network is powered on.

For each device on the network,

- ① Select the device in Tree view.
- ② From the File menu, select “Write to Non Volatile Memory” or use the short cut icon on the tool bar.



- ③ The following message will appear when the write operation is complete.



Auto Configure Function of M7CL-48ES and SB168-ES System

When using M7CL-48ES and SB168-ES in certain configurations (*), the Auto Configure function may be used to automatically setup audio patches and head amp control. Auto Configure may be used with systems having one M7CL-48ES and from 1 to 3 SB168-ES units. (For details, refer to the M7CL-48ES user's manual.)

(*): When using M7CL-48ES and SB168-ES on the same system, SB168-ES firmware version must be as follows:

SB168-ES firmware V1.1 or later

EtherSound module firmware C16 or later

For information on checking the version number and updating the firmware, refer to the "SB168-ES Firmware Update Guide".

If other EtherSound devices exist on the system, configuration must be done manually using the AVS-Monitor. In this case, disable the Auto Configure function before changing the configuration. The manual configuration procedure for word clock, audio patches, and head amp control is identical to that of other EtherSound devices.

While the Auto Configure function is enabled, each setup area on the AVS-Monitor will be grayed out and parameters can only be monitored. Changes can be made temporarily by disabling the Auto Configure function and unchecking the checkbox of the Lock Routing (**). However after setting the patches by using "Auto Configure", it is strongly recommended that all the patches are not changed.

After changing the setting via the AVS-Monitor, save the settings to the device's Non Volatile memory to be able to reproduce them the next time you turn on the devices.

This method is recommended when you wish to make your own configuration based on the Auto Configure function.

(**): In this case, the DIP switch settings of the SB168-ES and Auto Configure settings of the M7CL-48ES will temporarily be ignored, and settings of the AVS-Monitor will take priority. **Be careful of the following cases where the Auto Configure function will be activated again and overwrite the current settings.**

- When the Auto Configure function is enabled again via the AVS-Monitor.
- When the Auto Configure function is enabled on the STAGE BOX SETUP screen of the M7CL-48ES.
- When the power of the SB168-ES is turned on with its DIP switches set for Auto Configure.

It is necessary to configure the setting of each SB168-ES one by one via its Control Page if you use multiple SB168-ES units.

Step 8 Saving your Configuration

AVS-Monitor / M7CL-48ES Control Page

Properties Net Patch I/O Patch Control

M7CL-48ES

Synchro Status
 Synchro is OK.

Lock Routing
 Lock Inputs
 Lock Outputs

Options
 Emergency Clock

Tools
 Identify

Serial Communication Mode
 Multicast
 Unicast SB168-03145E
 Slave
 Tunnel Unavailable Stop

Settings from Console
 Auto Configure
 Network Mode Daisy Chain Ring

AVS-Monitor / SB168-ES Control Page

Properties Net Patch I/O Patch Control

YAMAHA SB168-ES

Synchro Status
 Synchro is OK.

Error Status
 Status is OK.

Lock Routing
 Lock Inputs
 Lock Outputs

Input - Signal Peak
 1 8 9 16

Output - Signal Peak
 1 8

Serial Communication Mode
 Multicast
 Unicast Unknown
 Slave
 Tunnel Unavailable Stop

Head-Amp Remote Option
 Head-Amp PC Remote Control

Tools
 Identify

Emergency Clock
 Emergency Clock

Quick Setup
 Setup ID (DIP SW): 1
 Head Amp Controller
 Mini YGDAI Slot Internal
 Mini YGDAI D-sub 9pin Connection (LS9)
 AVS-ESMonitor

Network Mode
 Daisy Chain Ring

Channel Allocation
 48 Inputs
 16 Outputs

APPLY

Settings from DIP Switch 5-8 (for M7CL-48ES)
 Auto Configure
 Network Mode Daisy Chain Ring
 Unicast Tunneling to Setup ID+1 ES Console

Quick Setup Function of SB168-ES and MY16-ES64 System

When using SB168-ES in certain configurations, the Quick Setup function may be used to automatically setup audio patches and head amp control. Quick Setup may be used with systems having one MY16-ES64 card and from 1 to 4 SB168-ES units. However after setting the patches by using “Quick Setup”, it is strongly recommended that all the patches are not changed. (For details, refer to the SB168-ES user’s manual.) If other EtherSound devices exist on the system, configuration must be done manually. The manual configuration procedure for SB168-ES units is identical to that of other EtherSound devices. When configuring SB168-ES manually, the parameters displayed in the Quick Setup box may be ignored since they do not reflect current parameter values. (The Quick Setup box only indicates what is going to be set when the APPLY button is pressed.)

AVS-Monitor / Quick Setup Box in the SB168-ES Control Page

Quick Setup
Setup ID (DIP SW): 1

Head Amp Controller

Mini YGDAI Slot Internal Connection (LS9)
 Mini YGDAI D-sub 9pin Connection
 AVS-ESMonitor

Network Mode

Daisy Chain
 Ring

Channel Allocation

48 Inputs

16 Outputs

APPLY