# Checking of Multicore cables

**simple and easy - This application note and a little routine enables to check even a complex multicore cable within a few minutes by one person.**

## What is a Multicore cable?

A multicore cable is an audio connection between the console and the stage and acts like an extension of the consoles connections. It is composed of a bundle of balanced, shielded lines. The whole bundle is inside a massive coat.

A stage box is a metal box including all XLR sockets for the connection of the audio signals, terminating the end on the stage. For the connection to the mixing-console the multicore cable is spiced. Each line has its own XLR cable connector. Alternatively a multipin connector can be used for the connection to the console.

## Traditional testing

The multicore cable is an important part of every PA setup and is often exposed to strong mechanical stress. Therefore it has to be tested periodically to ensure the good condition. You may use a simple continuity checker, which is very time-consuming and another person is required to carry out the job.

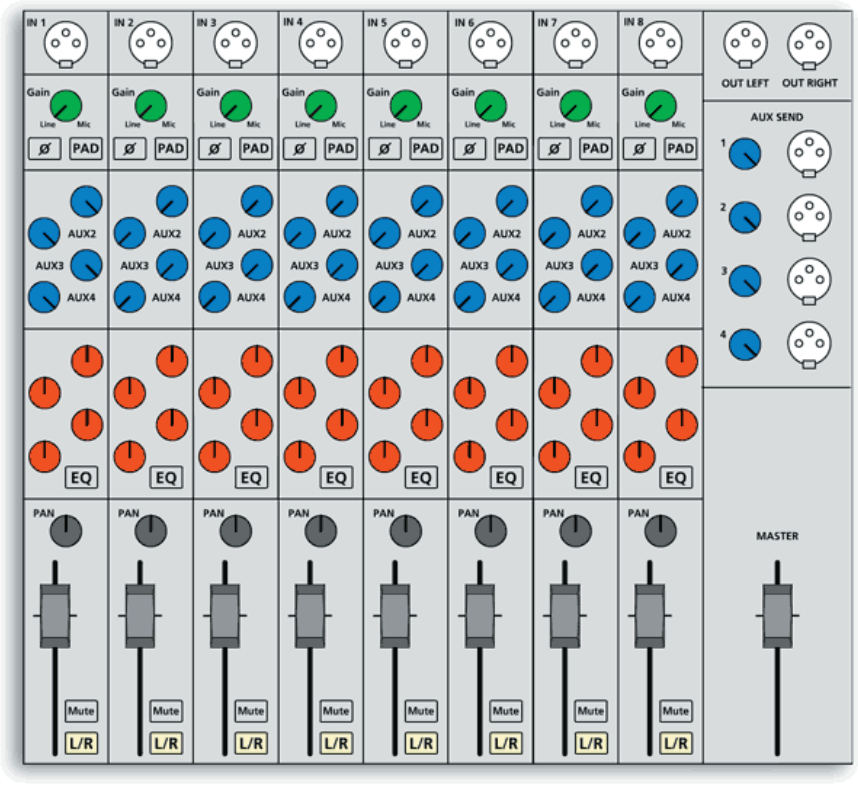
A major improvement in time and efficiency is the use of NTI's Minstruments. With the use of these handheld test instruments, Minirator and Minilyzer, multicore connections can be checked within a few minutes.

## Testing with NTI's Minstruments®

The best time to check the multicore cable is during the build-up of a PA system. The multicore cable shall be connected to the mixing-console, but not on the stage side (stage box) yet.

**Preparation:**
The console must be prepared in a manner that all input channels are mixed to all output channels. The gain of all channels must be equal and also the EQ section should be switched off.

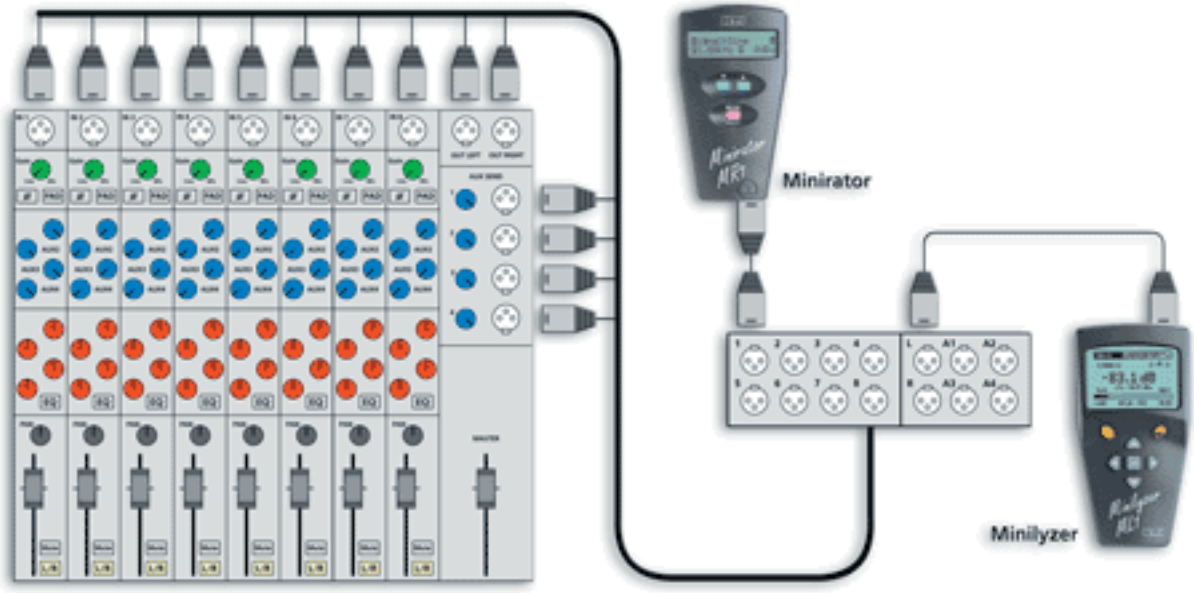
- Set gain controller to line (left stop)
- Switch off all pads
- Switch of all EQ sections resp. set all EQs to flat
- Disable all phase change switches
- Un-mute all channels
- Route all channels to the master output (L/R)
- Open all channel- and master faders to the 0dB mark




Additionally route the signal from channel one to all AUX buses and open the aux send master controls.

**What has to be checked:**
•Test for broken or shorted cables, loose contacts
•Polarity test of all cables

**Test set-up:**
Within the test procedure the Minirator MR1 acts as signal generator and the Minilyzer ML1 is used as audio analyzer.



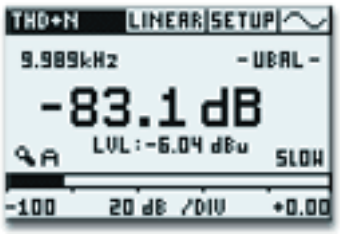

**The signal generator and -analyzer remain on the stage, while the mixing-console loops all signals from the inputs trough to the outputs and so back up to stage again.**

## Test for broken or shorted cables, loose contacts


**Setup of the MR1 for seeking broken or shorted cables using the ML1 as distortion analyzer.**

On balanced lines the signal is transmitted on two separated lines with opposite phase. If one line fails or a short circuit between line and shield occurred, there still may be an audio signal on the line, but with less level as before (e.g. less 6 dB). Such signals may not be accepted by all mixing-consoles, depending from model to model.

Checking the multicore is done using a combined level and distortion measurement. The distortion measurement is very sensitive to loose contacts. These are quickly indicated by actable distortion values.




**Distortion analyzer of the ML1. The small value (LVL) shows the level of the signal. The result of a broken cable is show in the above screen, indicated by the balance indicator (UBAL).**

During preparation the mixing-console gains were set to (approximately) the same value. Therefore, all input channels have the same effect on the output channel. During testing, the level at the output is measured. This level has to be the same for all input channels. Variations of the level of about 6 dB or more from the average indicate a defective line.

- Switch on the ML1 and select the measurement function THD+N (use the XLR input only)

- Switch on the MR1 and select the audio test signal SINUS, 0 dBu, 1 kHz; (use the XLR output only)

**Checking the input channels:**
Use the Minirator MR1 to supply a test signal to all inputs, one after each other. The console loops the signal to the outputs, where the Minilyzer ML1 analyzes the test signal:

- Connect the ML1 to the main output (L/R) of the stage box

- Connect the MR1 to input channel 1 of the stage box and check the result at the ML1

- Connect the MR1 to input channel 2 of the stage box and check the result at the ML1

- Repeat this procedure for all input channels. The ML1 remains in the same position.

**Checking the output channels:**
To check the outputs the Minirator MR1 is connected to the first channel. The Minilyzer is used to check all outputs, one by one:

- Connect the MR1 to input channel 1 of the stage box

- Connect the ML1 to output 1 of the stage box and check the result at the ML1

- Connect the ML1 to output 2 of the stage box and check the result at the ML1

- Repeat this procedure for all input channels. The MR1 remains in the same position.

The indicated level (small value) has to be nearly equal for all channels. The distortion values should not straggle for more than +/- 2dB

At the same time it is important to monitor the balance indicator  displayed on the ML1. An out of center arrow indicates a defective of the multicore cable or of the mixing-consoles output. In case the balance indicator shows "-UBAL-" (unbalanced) a cable is broken or the output of the mixing-console is unbalanced.

## Test of polarity


**Setup of the MR1 for the polarity check**

Inside the multicore cable the connections always have to be 1:1, i.e. pin 2 of XLR of the stage box has to be connected to pin 2 of the XLR-connector on the console side. If the balanced lines are crossed (pin 2 connected to pin 3) acoustical problems may result.

- Select the POLARITY signal, 0 dBu at the Minirator MR1.


**Polarity measurement function. XLR/RCA input must be selected from the input selector (IN).**

- Select the POLARITY measurement function, IN:XLR/RCA at the Minilyzer ML1.

To check the polarity all inputs and outputs of the multicore cable are checked again with the shown Minstruments settings as described above (checking the input-/output channels).

**The ML1 has to show "POSITIVE" for all input and output channels.**

## Before soldering

In case a failure is detected, the corresponding channel of the console needs to be checked for correct setup in detail. In the worst case the multicore cable is o.k. but the console is defective. This can be checked easily with a measurement directly at the console.

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