TECHNICAL BULLETIN

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MADI CONNECTION SYSTEM SPECIFICATION NOTES
For DiGiCo and Soundtracs consoles

The following notes are intended as a guide to system engineers planning external MADI (Multi-channel Audio Digital Interface) systems for permanent building installation, external patch systems etc.

These specifically relate to the use of current console MADI systems such as D5, DS00 and more recent consoles. They do NOT cover older MADI interface hardware used in DPC2, DS3, DS3B, early D4 (shipped before Oct 2005). See the mixer installation manual for MADI considerations in these mixers.

Using standard cables:

Standard external cables are supplied by DiGiCo (5 or 100 m) supplied with the standard 75 ohm BNC and manufactured with European specification RG59U cable. This is basically a good quality video connection cable.

In addition factory cables connectors are individually pull tested to 5Kg. Many cheap ready made cables would fail this test.

It should noted that MADI is approximately 0.5V RMS 125MHz serial data. Earth (ground) differentials of over 0.25V due to poor power wiring will effectively stop the system from functioning.

Using installed custom cabling

The recommended cable RG59U specification.
Note is NOT the same specification as USA standard RG59B.

Impedance	75ohm
Diameter	6.1mm
Capacitance	68pF / m
Loss	12dB @100MHz per 100m
	18dB @200MHz per 100m

Cont:

Installed cabling for longer runs should meet or exceed the above specification.

It is clear that for short link cables (less than 10m) the choice of cable is less critical.

In addition the use of good quality terminations cannot be overstated. A properly made crimp BNC is a reliable and low loss connection. A key point here is to use the connector specifically designed for the cable in use and the correct crimp tool. A bad connection will cause much trouble.

Solder BNC connectors are not inherently better and are more time consuming and difficult to make well unless the technician is experienced in these connectors.

It is obvious but worth noting again, that MADI connections carry up to 56 channels of audio. A cable failure will affect this number of channels, not just 1. A broken MADI cable may prevent the entire mixer system from functioning.

Installed cable for long runs (around 100m) should match or exceed the standard cable spec. The maximum length is determined by several factors including electrical or RF frequency noise. It also varies with the installed environment, the quality of the cable screen (shield) the velocity factor (phase shift) of the cable etc. which are not usually specified for video cables.

In practice, it is known 150m RG59 cables work reliably in normal environments, without intermediate connections. Anything above this should be tested in the intended environment prior to use.

The use of MADI BNC patch bays is not recommended, due to long term reliability problems and due to possible earthing problems as noted above.

It should also be noted that although MADI uses video cable, never attempt to send MADI via video distribution or switching systems. The exception to this is use of simple wide band (>200MHz) video splitter amplifiers (with no vertical interval processing) to provide a MADI split, typically for use with MADI input record systems.

Testing custom cable systems

Use a good 200MHz (minimum) oscilloscope.

Do not use a probe but a straight BNC cable input from a T piece.

Connect a mixer MADI output to a 75 ohm load via the long cable under test.

Insert the T connector at the mixer end. You expect to see about 900mV peak-peak clean square wave at about 120MHz on the ‘scope.

Insert this T at the load end, expect to see about 220mV peak-peak, ragged waveform on a good cable. In a marginal system with bad cable this will be about 100mV with a terrible waveform.

If a 100MHz RF generator is available, this is easier to see. Look for 12dB loss at 100MHz for a good cable. (e.g. 1V RMS input 250mV RMS output)

Ensure the 75 ohms is at the far end of the cable at all times. Measurements without a load have no meaning.