



CAT-LINK and Q-MAX

It's pure digital. It provides real-time encoding/decoding with no compression techniques and with no audible delays to annoy on-air talent. It can send composite and high quality discrete audio channels. And it means flawless bi-directional transmission for your station.

It's CAT-LINK (Composite Audio Transmission Link) from QEI.

Plug it in...turn it on...and notice the difference immediately. CAT-LINK allows you to bring audio processing back to the studio where it's easier to operate and maintain. Expand your STL and TSL capability without additional phone lines. In fact, its single digital T1 line allows you to replace multiple analog phone lines...and realize even greater savings.

CAT-LINK is the digital STL/TSL for the 90's and beyond. Its output signal is compatible with T1 (DS-1) facilities, fiber optic transmission media, and T1 (DS-1) microwave using commercially available T1 subcarrier generators with a bandwidth as little as 1 MHz.

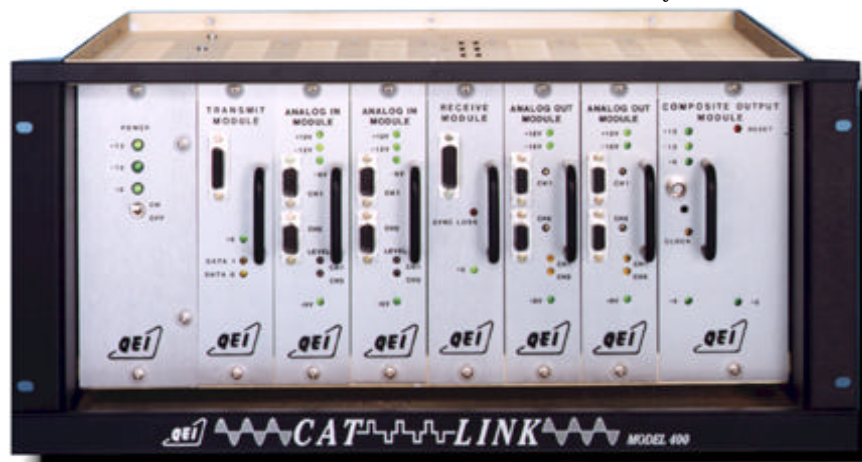
- The **ONLY** system to transmit FM composite digitally on T1
- The **ONLY** system available with real-time transmission, eliminating audible delays.
- An expandable MODULAR system.

- Allows clear, clean, undistorted program material in any kind of weather.
- Allows complete control of your audio from the studio.

Q-MAX Modules

Increase the performance of your existing or new CAT-LINK STL/TSL system with Q-MAX MODULES. The

system utilizes a 16-bit Sigma-Delta analog-to-digital converter on the input module and an 18-bit Sigma-Delta digital-to-analog converter on the output module. The modules utilize 64-times oversampling



inputs and outputs.

Q-MAX MODULES have self-calibrating DC-offset circuitry to allow passage of ultra-low frequency audio components, thus avoiding interference with your station's "sound signature". Phase and amplitude linear, digital input and output filtering means that no artifacts are introduced into program material.

- Input and output digital data is completely linear, with no data or audio compression.
- There are no analog "filters" in the Q-MAX transmission chain, other than a protective RC network.
- Automatic muting means no "digital noise" should the data path fail.

CAT-LINK and Q-MAX

TECHNICAL SPECIFICATIONS

SAMPLE CAT-LINK CONFIGURATIONS*

STEREO FM + TWO SCAS

<i>STL</i>	<i>BANDWIDTH</i>
Composite FM	53 kHz
Audio SCA #1	6 kHz
Audio SCA #2	6 kHz
Control	3 kHz

<i>TSL</i>	<i>BANDWIDTH</i>
Sat. Audio SCA #1	15 kHz Q-Max
Sat. Audio SCA #2	15 kHz Q-Max
Telemetry	3 kHz
RPU Audio	10 kHz

STEREO FM + CO-LOCATED AM

<i>STL</i>	<i>BANDWIDTH</i>
Composite	FM 53 kHz
AM Audio	10 kHz
Control	3 kHz

<i>TSL</i>	<i>BANDWIDTH</i>
Sat. Audio SCA #1	15 kHz Q-Max
Sat. Audio SCA #2	15 kHz Q-Max
Telemetry	3 kHz
RPU Audio	10 kHz

*CAT-LINK firmware accommodates many combinations of channels, provided all fit within the 1.544 megabit DS1 standard. These sample configurations represent only a few of the wide range of possible CAT-LINK configurations. Contact QEI for more information on your particular requirements.

CAT-LINK SPECIFICATIONS

TRANSMISSION MEDIA

Public Network DS1 circuit: DSX-1 (T1) per ANSI T1.102 (1987) with D4 framing and AT&T Pub.#62411 (i.e. AMI, ones density); ESF framing or B8ZS line coding available with special CSU.

Other DS1 applications: DSX-1 per ANSI T1.102 (1987)

Optical fiber (with optional converter)

All transmission media capable of accepting a DSX-1 interface

DIGITAL OUTPUT INTERFACE

Public network DS1 circuit: DSX-1 per ANSI T1.102(1987) with D4 framing and

AT&T Pub. #62411 (i.e. AMI, ones density); ESF framing or B8ZS available with special CSU

Other DS1 applications: DSX-1 per ANSI T1.102 (1987)

Video radios: 1 Vp-p into 75 Ohms; greater than 40 dB down at 3 MHz

DIGITAL INPUT INTERFACE

DS1 applications: 0 dB sx to -15 dB sx

Video applications: 1 Vp-p into 75 Ohms

FM COMPOSITE STEREO INPUT/OUTPUT

Input level (100%): 3.5 Vp-p

Input level (clip): 4.55 Vp-p

Input impedance: 2 kOhm unbalanced (BNC)

Output level: 3.5 Vp-p nominal, adjustable 2.75-5.0 Vp-p

Output impedance: 300 Ohms unbalanced (BNC)

Quantization: 14 bit linear maximum

Distortion (THD/IMD): 0.01%

Separation, 15 kHz: 55 dB

Q-MAX AUXILIARY INPUT/OUTPUT MODULES

Channels per module: Stereo

Input level (clip): 0 to 10 dBm

Input impedance: 600 Ohms active balanced/unbalanced/HiZ

Bandwidth: 10, 15 (DIP)

Quantization: 16 bit capable; configuration dependent; maximum S/N 88 dB

Distortion: 0.01% THD minimum; configuration dependent

Output level (clip): 0 to 10 dBm

Output impedance: 600 Ohms, active balanced

STANDARD AUXILIARY INPUT/OUTPUT MODULES

Channels per module: 2

Input level (clip): +12 dBm

Input impedance: 600 Ohms, active balanced

Bandwidth: 3, 5, 6 or 10 kHz; EPROM programmable; maximum S/N 72 dB

Distortion: 0.1% THD minimum; quantization-dependent

Output level (clip): +12 dBm

Output impedance: 600 Ohms, transformer balanced

QEI maintains on ongoing of research and development to insure the finest product

performance and quality. All specifications subject to change without notice.

Protected by Patent #5,054,070 1991





CAT-LINK D-MAX Modules **for AES/EBU Digital Audio Interface and** **Integral Digital Stereo Generator Capability**

QEI Advances the State of the Art again with variable sample rate technology for AES/EBU digital audio transport over a T1! The D-MAX module system for CAT-Link is designed for those who need to transport AES/EBU digital audio from one location to another without audio compression or transcoding effects.

With the D-MAX module system it is possible to take AES/EBU audio data at any sample rate from 24kHz to 48kHz up to 16 bits resolution, and transport the audio data across a T1 channel. This transport takes place without using any audio compression whatsoever. Therefore there are no transcoding effects with D-MAX Modules.

Transcoding is a very important consideration when your station is either compressing its source material with a harddisk or digital cart system, or thinking about the future, with digital audio broadcast systems that will utilize audio compression in their transmission system.

With CAT-Link's custom configurations you can even transport multiple digital audio data streams on a SINGLE T1! The tradeoff is made by only using the bandwidth and resolution that the channel requires, versus the extra space that is usually wasted when sending information that cannot be utilized in the final product. As an example, when sending audio to an AM transmitter the maximum bandwidth required is 10kHz, not the 20kHz that is available at a 44.1 sampled digital audio path. Also, the signal to noise required can be limited to 72dB for a 12 bit resolution. This reduces the channel capacity required by almost 60% without any audio compression!

AES/EBU is fast becoming the norm around studios and transmitters. The medium is very robust and is readily run over long distances without fear of cable equalization, hum

and noise pickup. This makes AES/EBU digital audio ideal for use in both studio and transmitter environments.

D-MAX modules do not induce any audible delay. QEI believes that STL's should be as transparent to the audio as possible. If audible delay is added by the STL then the on-air personnel may have difficulty in listening to the off-air mix. This is not an insurmountable problem but does cause extra complexity where none has been required before.

D-MAX modules give the CAT-Link user unique operational capabilities that no other manufacturer can offer. You can use a D-MAX input module at the studio in conjunction with an Enhanced Composite Output module at the transmitter, to give you a digital stereo generator *as an integral part of your CAT-Link STL system!* This allows you a true digital audio path almost directly to your FM exciter! As a backup, the audio can also be output at the transmitter in both the digital and analog form *simultaneously* with the composite signal.

You can use the D-MAX module system with Q-MAX modules to convert between the analog and digital domain. As an example you can input digital

audio data into the CAT-Link at the studio and extract BOTH digital audio data and the analog audio at the transmitter!

QEI is a world leader in bringing advanced digital audio products to the broadcast market. With CAT-Link QEI offers the ONLY linear, uncompressed FM Composite Digital STL to the broadcaster. Now, with the addition of the D-MAX modules a whole new realm of possibilities open up for the broadcaster who is seeking the maximum technological return for his capital equipment budget.

Contact QEI today for more information on the worlds best broadcast digital audio products.

