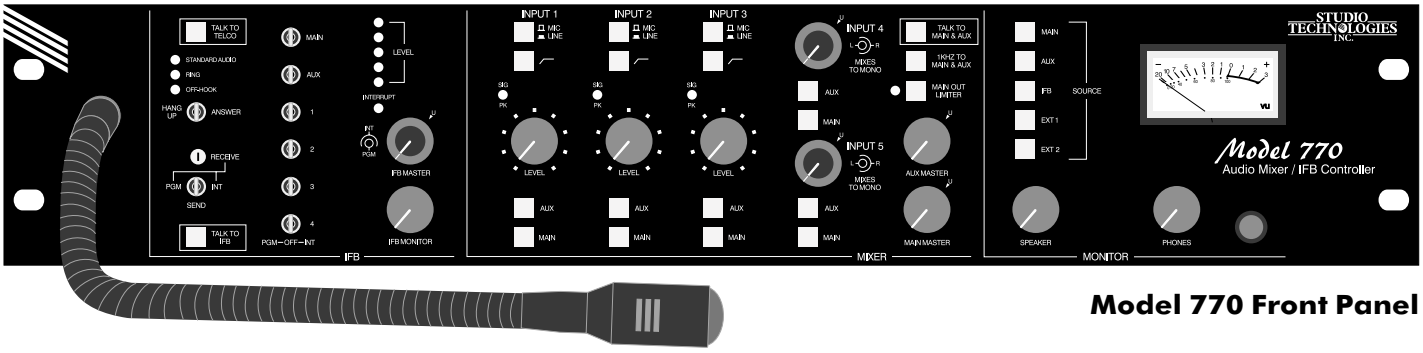
Model 770

Audio Mixer / IFB Controller

Now for the first time mobile broadcast applications can have both an audio mixer and an IFB controller in one compact, highly integrated package. Designed expressly for electronic-news-gathering (ENG) vehicles, the Model 770 doesn't sacrifice features or performance to achieve its two rack-space size. Using its experience in "on-air" and IFB audio, Studio Technologies was able to design a product with an extensive set of features and excellent overall audio performance, that still meets the special needs of fast-paced news-gathering operations.



Model 770 Front Panel

STUDIO TECHNOLOGIES INC.

Model 770 Audio Mixer / IFB Controller

The Model 770 consists of three main sections: mixer, IFB, and monitor. Each section performs in a manner which meets or exceeds those provided by "stand alone" products. In addition, by integrating audio mixer and IFB functions into one unit, capabilities are provided that have previously been unavailable.

Mixer Section

Located in the center of the Model 770's front panel, the mixer section provides three mic/line inputs, two stereo line inputs, and two monaural output buses. The features were carefully selected to provide a balance between technical performance and ease of use.

Mic/Line Inputs

Three transformer-coupled input channels are provided for connection to microphone or line-level signals. Features for each input channel include selectable input sensitivity, low-cut filter, and level control. For operator assistance, a bi-color LED provides signal present and peak indication. Two push-button switches control the routing of the input signal to the main and auxiliary (AUX) audio buses. For convenience, the mic/line input sensitivity buttons, like all of the Model 770's operator controls, are located on the front panel.

Stereo Line Inputs

Two stereo line-level input channels are provided, and are intended for connection to audio signals associated with video playback. The left and right input signals, after passing through individual level controls, are automatically mixed to monaural. This supports "real world" applications where dialog may be on one channel and background or "natural" sound on the other. Two buttons control the routing of the monaural signal to the main and AUX audio buses.

Main Audio Bus

Signals from the mic/line and stereo line input channels combine to create the main audio bus. The main bus is monaural, and includes a studio-quality limiter/compressor to control the dynamic range. Far from a simple "clipper," the limiter/compressor circuit utilizes a sophisticated laser-trimmed voltage-controlled-amplifier (VCA) integrated circuit for quiet, low-distortion level control. For installation flexibility, four output circuits provide access to the main bus; three are electronically balanced, one is transformer-balanced.

AUX Audio Bus

Signals from the mic/line and stereo line input channels can be directly assigned to the auxiliary (AUX) bus. The AUX bus is monaural, and can be used for special applications such as a second bus for on-air use. Direct access to the AUX bus is provided by means of two output circuits; one is electronically balanced, the second is transformer-balanced.

Configurable Outputs

Three line-level outputs can serve in a wide range of installation-specific applications. DIP switches, located on the back panel, are used to select from five available signal sources: main audio, AUX audio, IFB audio, IFB program-only audio, and mic/line input channel direct. The switches can be set to create a variety of output configurations, such as additional main or AUX outputs, a mix of main and AUX, additional IFB-related outputs, or a "direct" mic/line output.

Support Functions

A push-button switch allows voice signals from the front-panel-mounted gooseneck microphone to be routed to the main and AUX audio buses. This "talk-back" function is usually found only on larger audio consoles. A continuous 1kHz "0-level" sine-wave reference signal is available by means of a connector on the back panel. The 1kHz signal can also be assigned, by means of a front-panel push-button switch, to the main and AUX audio buses.

IFB Section

The IFB section provides a full set of resources to create and maintain one channel of excellent IFB. A full set of controls and indicators allows fast, simple operation. A front-panel-mounted gooseneck microphone allows an operator to make "local" interrupts. IFB audio level is displayed by a 5-segment LED meter, while interrupt status is displayed by an LED indicator.

Unique to the Model 770 is the ability to use each of the IFB section's seven audio sources as a program or an interrupt source. A voice-operated (VOX) circuit monitors the interrupt bus for signal activity. Whenever a signal

meets the requisite parameters, it is connected to the IFB output. Using a carefully designed fast-attack/slow-release circuit results in very good interrupt audio performance. Whenever interrupt is active, program audio can be configured to either fully mute during interrupt activity, or reduced in level ("dimmed") by 10dB. While a full mute is normally desired, the "dim" mode can serve special applications, such as sports events.

The IFB section doesn't take a "back seat" when it comes to audio quality. Sophisticated "ramping" analog switches are used to ensure "click-free" audio. Studio-quality limiter/compressor circuits serve the interrupt audio signal and the gooseneck microphone. These circuits help to minimize level variations, making talent cues more intelligible and reducing the risk of abnormally high signal levels from reaching the talent's ears.

Audio Sources

Seven audio signals can be selected to serve as program or interrupt sources: the mixer section's main and AUX bus audio, four external line-level inputs, and an internal telephone interface. More than one input can be simultaneously selected to create a mix of signals for program and interrupt audio. Without external patching or connections, the Model 770's main and AUX audio buses can be directly assigned as IFB program or interrupt sources. Four external line-level inputs allow a variety of audio sources to be connected. For assistance during installation, input level trim pots, located on the back panel, allow the nominal "+4" input level to be adjusted over a ±8dB range.

Telephone Interface

The Model 770 contains a telephone interface that, using an 8-bit micro-controller integrated circuit, is powerful yet simple to use. Overall, the telephone interface is designed to receive audio signals for use by the IFB section, or to send out audio from the IFB or mixer sections. A front-panel switch selects if receive audio will serve as a program or interrupt source, or if the telco interface will send audio. The receive level of the telephone interface is adjustable using a trim pot located on the front panel. DIP switches, located on the back panel, allow the selection of main, AUX, or IFB audio as the send source. For operator assistance, a push-button switch allows voice signals from the gooseneck microphone to be sent out the telephone interface. This "talk-to-telco" function is extremely useful, especially when initial IFB connections are being established with a remote facility.

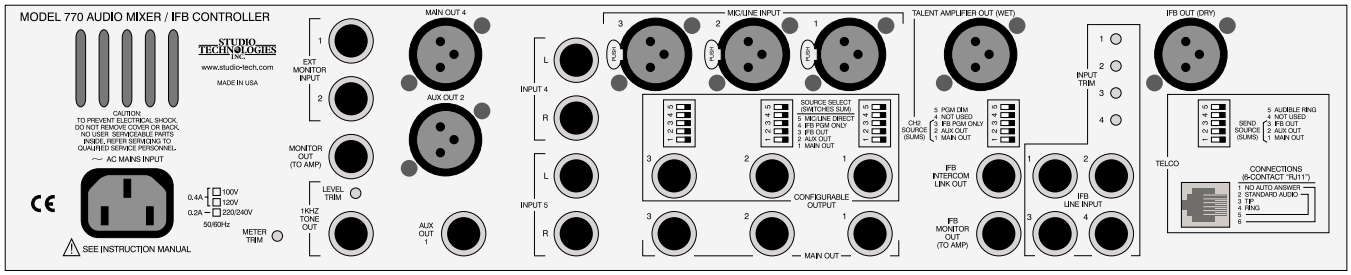
The telephone interface is unique in that it allows two very different telephone "lines" to be correctly interfaced, meeting the needs of contemporary installations. The two operating modes make the interface compatible with telephone lines or standard audio signals. When set to the telco mode, the interface is compatible with 2-wire loop-start DC-biased ("wet") tip-and-ring circuits. When set to the standard audio mode, the interface is directly compatible with audio signals provided by many cellular or satellite telephones. Becoming increasingly common for IFB applications, these telephones often don't provide a "wet" interface, but do exhibit the audio levels of a conventional telephone line.

When the interface is set to the telco mode, full loop current monitoring and control is implemented. A front-panel switch allows the telephone line to be seized (answered) or disconnected (hung up). The interface will automatically hang up if a telephone-company-provided disconnect signal is received. An audible signal and LED indicator are active whenever "ringing" voltage is present. An auto-answer function is also provided.

When the interface is set to the standard audio mode, the loop-current-specific features are disabled, and the interface operates as a transformer-coupled balanced audio input. The input level sensitivity is optimized for use with telephone-type audio signals.

IFB Outputs

The IFB section contains four outputs: talent amplifier, line, intercom link, and monitor. The talent amplifier output is a "wet" output that supports the connection of



Model 770 Back Panel

belt pack modules from Studio Technologies. A single XLR-type cable links the talent amplifier output with up to four Model 32 or Model 33 Talent Amplifiers. The talent amplifier output provides DC power, along with two audio channels. The first audio channel provides IFB audio, while the second is configurable. Using DIP switches, located on the back panel, three audio sources are available: the mixer section's main and AUX bus, and IFB program only. This allows a broad range of applications to be supported.

The line output is transformer coupled, with a nominal level of +4dBu. Well protected from damage due to externally generated signals, it is suitable for connection to devices remote from the Model 770. The intercom link output allows the direct connection of IFB audio into broadcast intercom systems. The output impedance and signal levels were carefully designed to eliminate the need for external "pads," isolation resistors, or blocking capacitors.

While the Model 770's monitor section allows monitoring of the IFB signal, for efficient broadcast operation it is often imperative that the IFB signal be continuously monitored. This is why the IFB section provides a separate line-level monitor output and associated level control. With this output, the operator can have a monitor speaker dedicated exclusively to IFB.

Monitor Section

The Model 770's monitor section gives the operator a powerful set of resources. Separate outputs and level controls are provided for connection to a monitor amplifier and headphones. In addition to monitoring the main, AUX, and IFB audio buses, provision has been made for monitoring two external audio sources. These external monaural inputs are intended to be connected to off-air, microwave, or satellite receivers.

Multiple sources can be simultaneously selected for monitoring. This can prove useful by allowing, for example, an operator to monitor both a local mix and an externally provided mix-minus signal. A mechanical VU-type meter provides a "user-friendly" indication of audio-signal level. To limit the chance of burned-out meter-scale illumination, the Model 770 implements a solid-state, LED-based lighting scheme.

Installation

While the Model 770 is loaded with features, it only requires two spaces in a standard 19-inch rack. XLR-type and ¼-inch, 3-conductor audio connectors are used for audio interconnections. An "RJ11-type" modular jack is used by the telco interface. Mains power is factory configured for 100, 120, or 220/240V, 50/60Hz.

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Specifications

General

Connectors:

Mic/Line: 3-pin XLR-type, female

Outputs — Main 4, AUX 2, IFB Line, and IFB Talent Amplifier: 3-pin XLR-type, male

All Other Audio: ¼-inch 3-conductor phone jacks

Telco Interface: 6-position modular jack (RJ11-type)

AC Mains: 3-blade IEC-type

AC Mains Requirement:
100, 120, or 220/240V, ±10%, factory configured; 50/60Hz;
40 watts maximum

Dimensions (Overall):
19.00 inches wide (48.3cm)
3.49 inches high (8.9cm)
9.50 inches deep (21.4cm)

Mounting:
2 standard rack spaces

Weight:
13.50 pounds (6.1kg)

Mixer Section

General Audio Parameters:
Frequency Response: 20Hz-20kHz, ±0.2dB
Distortion (THD+N): 0.04%, measured at 1kHz
S/N Ratio: 85dB, referenced to +4dBu

Mic/Line Inputs: 3
Type: balanced, transformer-coupled
Level Range: switchable for mic or line
Low-Cut Filter: –3dB at 85Hz, 18dB/octave slope

Stereo Line Inputs: 2
Type: electronically balanced
Nominal Level: +4dBu

Main Audio Bus Limiter/Compressor:
Threshold: +10dBu, nominal (6dB above nominal output level)
Slope: 5:1, nominal

Outputs — Main 1, 2, 3, AUX 1:
Type: electronically balanced
Nominal Level: +4dBu
Maximum Level: +27dBu into 10k ohms, +26dBu into 600 ohms

Main Output 4, AUX Output 2:
Type: balanced, transformer-coupled
Nominal Level: +4dBu
Maximum Level: +21dBu into 10k ohms

Talk to Main and AUX:
Connects gooseneck microphone to main and AUX mixing buses

1kHz Tone Output (Sine Wave):
Type: electronically balanced
Output Level: +4dBu, nominal

IFB Section

General Audio Parameters:
Audio Switching and Muting: "clickless" using special "ramping" analog switches
Frequency Response: 20Hz-20kHz, ±0.5dB
Distortion (THD+N): 0.04%, measured at 1kHz
S/N Ratio: 71dB, referenced to +4dBu

Voice Operated (VOX) Interrupt Function:
Detection Bandpass: 400 to 1400Hz, nominal
Detect Time: less than 1mSec

Limiter/Compressors: studio quality, dual slope

Line Inputs: 4
Type: electronically balanced
Nominal Level: +4dBu, adjustable ±8dB

Talent Amplifier Output:
Application: provides power and audio signals for up to four Model 32 or Model 33 Talent Amplifiers

IFB Line Output:
Type: balanced, transformer-coupled
Nominal Level: +4dBu

IFB Intercom Link Out: allows direct connection to RTS/Telex® intercom buses

Telephone Interface:
Operating Modes: selectable for use with telephone line or standard audio signals
Telephone Line Requirements: 2-wire, loop start, 10mA loop current minimum
Telephone Line Disconnect: manual, using front-panel switch; automatic after detection of break in loop current
Telephone Line Interface Control: switch on front panel allows manual off-hook and manual hang-up functions
Auto Answer: answers after 2 rings (can be disabled)
Receive Audio Level: –15dBu, nominal, adjustable ±8dB
Send Audio Level: –6dBu, nominal

IFB Monitor Output:
Type: electronically balanced
Nominal Level: –4dBu

Monitor Section

Monitor Output:
Type: electronically balanced
Nominal Level: –2dBu

Headphone Output:
Compatibility: intended for connection to headphones with impedance of 100 ohms or greater
Maximum Voltage: 8Vpp, 100 ohm load

External Monitor Inputs: 2, monaural
Type: electronically balanced
Nominal Level: +4dBu

Meter:
Type: analog, VU scale
Illumination: 7 LEDs

Specifications subject to change without notice.