IFB Plus

Model 2A

Central Controller

User Guide

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Introduction

The IFB Plus Series Model 2A Central Controller from Studio Technologies is a highly integrated, 2-channel IFB (interruptible foldback) unit. It is the main component of the IFB Plus Series which is expressly designed to provide talent cueing for ENG, SNG, OB, and mobile production facilities. It can also find use in fixed installations that need a compact but feature-rich standalone IFB system. The performance and features of the Model 2A, along with its companion accessories, reflect the needs of contemporary applications. Only after extensive polling of field production and engineering personnel was the Model 2A's feature group established. We think you'll find it to be a great addition to your facility.

What This User Guide Covers

This guide is designed to assist you when installing, configuring, and using the Model 2A Central Controller and related accessories. The following items will be covered in this User Guide:

Model 2A Central Controller

The Model 2A Central Controller is an integrated 2-channel IFB unit intended for applications where space is at a premium, yet high performance is still required. The unit contains everything required to implement a full-featured system in a single space (1U) of a 19-inch rack enclosure. The unit's resources include multiple program inputs, integral telephone interfaces, monitor amplifier output, internal interrupt microphone, and support for additional talk locations. The unit's power input can range from 100 to 240 volts, 50/60 hertz. This "universal input" ensures correct operation virtually anywhere in the world.

Model 22 Access Station

The Model 22 Access Station is used by a producer or director to access the Model 2A's two IFB channels. It allows connection of a Studio Technologies' Model 11A Gooseneck Microphone or a line-level audio source. The unit contains two lighted push-button switches which display IFB interrupt status. Up to four Model 22 units can be connected to and powered by a Model 2A Central Controller. The Model 25A 19-Inch Rack Adapter allows a Model 22 Access Station and Model 11A Gooseneck Microphone to be mounted in a single space (1U) of a standard 19-inch rack. The Model 28A Panel Adapter allows a Model 22 and Model 11A Gooseneck Microphone to be installed in an opening made in a table, equipment console, etc. The Models 11A, 22, 25A, and 28A are purchased separately.

Figure 1. Model 2A Central Controller Front and Back Views

Model 24 Access Station

The Model 24 Access Station allows broadcast personnel to access the four IFB channels associated with two Model 2A units. The Model 24 contains five lighted pushbutton switches, four of which are used to activate and display the status of the four IFB channels and one that provides an "all call" function. The Studio Technologies' Model 11A Gooseneck Microphone or a line-level audio source can be connected. Up to four Model 24 units can be connected and supported by two Model 2A units. The Model 27A 19-Inch Rack Adapter allows a Model 24 and a Model 11A Gooseneck Microphone to be mounted in a single space of a 19-inch rack enclosure. The Models 11A, 24, and 27A are purchased separately.

Model 32A and Model 33A Talent Amplifiers

The Model 32A and Model 33A Talent Amplifiers are self-contained "beltpack" units that support connection of talent earpieces or headsets. Purchased separately, a total of up to six of these talent amplifiers can be connected to, and powered by, a single Model 2A Central Controller.

The Model 32A is intended for use by on-air and production support personnel. It connects to the Model 2A's talent amplifier output by way of a standard audio cable that uses 3-pin XLR connectors. A "loop through" 3-pin XLR connector is provided on the Model 32A for easy interconnection with additional talent amplifier units. The Model 32A contains a power active LED indicator light and 2-position source switch, along with an output level control. For user convenience, both ¼-inch and 3.5 mm monaural output jacks are provided. Either IFB channel 1 or 2 can be selected, amplified, and sent to the output jacks with the level adjusted as desired.

The Model 33A is similar to the Model 32A but allows creation of a "mix" of IFB channels 1 and 2. Two level controls, along with a source select switch, allows camera and production personnel to hear cues from either or both IFB channels. This allows IFB signals intended for support personnel and on-air talent to be simultaneously monitored. For user convenience, ¼-inch and 3.5 mm monaural output jacks are provided.

Model 2A Central Controller

Mounted in a single space of a 19-inch rack, the Model 2A provides everything required to implement a 2-channel IFB system. Features include multiple program inputs, telephone interfaces, voice-operated (VOX) interrupt, level meters, monitor amplifier output, and an internal interrupt microphone. In addition, up to four Model 22 or Model 24 Access Stations can be connected to a Model 2A, allowing producer or director positions to access the IFB channels. In addition, up to six Model 32A or Model 33A Talent Amplifiers can be connected to a Model 2A. These portable "beltpack" units interconnect with a Model 2A using standard microphone cables. Both DC power and two channels of audio are supplied on just one 3-conductor cable, providing personnel with convenient, reliable access to the two IFB channels.

The Model 2A packs numerous features into a rugged yet lightweight single-rack-space (1U) enclosure. Standard connectors are used throughout, including 3-pin XLR, ¼-inch 2-conductor, 9-position D-subminiature, and modular telephone (RJ11) jacks. A source of 100-240 volts,

50/60 hertz is connected via a detachable mains cord and provides power for the Model 2A.

IFB Channels

The Model 2A contains two independent IFB channels. Each channel has individual controls and indicators, including program source select switches, program level control, 5-segment LED level meter, and LED status indicators. The features of one of two identical channels will be highlighted in this paragraph. Six switches allow the four program audio inputs and audio coming from the two telephone interfaces to be selected as program audio sources. A rotary level control allows adjustment of the program audio level relative to that of the non-adjustable interrupt audio level. A 5-segment LED meter displays the level of the composite IFB audio signal. (The composite audio signal is the combination of the selected program audio source(s) and the interrupt audio source(s).) The level meter facilitates the rapid setting of the program level control, as well as providing a general indication of the IFB channel's signal level.

Each channel's composite IFB audio signal (a mix of program and interrupt audio) is sent to four places: a line-level output, the talent amplifier output, telephone interface 2, and the monitor output section. Each line output provides an electronically balanced, line-level signal that interfaces with external equipment via a 3-pin XLR connector. The talent amplifier output provides IFB channel 1 and 2 audio, along with 24 volts DC power on one 3-pin XLR connector. Any combination of up to six Model 32A or Model 33A units can be connected to the talent amplifier output. For application flexibility, the talent amplifier output provides 200 ohm line impedances on both of its output channels. This allows direct connection of not just listen-only devices, such as the Models 32A and 33A, but party-line (PL) user beltpacks as well. In this way popular PL beltpacks, from suppliers such RTS® and Clear-Com®, can be connected and used to create a small PL intercom system that includes IFB listen. A selector switch associated with telephone interface 2 can be used by an operator to send either IFB channel 1 or 2 out the connected phone line. The monitor output section allows loudspeaker monitoring of audio from either IFB channel 1 or 2. (An optional external loudspeaker is required.)

Program Inputs

The Model 2A contains four line-level program inputs. Each can be individually assigned to the two IFB channels, with the ability to assign multiple program inputs to an IFB channel. Program signals enter the unit via four 3-pin XLR connectors located on the unit's back panel. The program inputs are electronically balanced and feature low noise, low distortion, and high common mode signal rejection. Each program input has a trim potentiometer associated with it. The trim pots, accessible from the back panel, allow source signals with a nominal level of –10 to +8 dBu to be correctly utilized.

Program audio is muted whenever interrupt activity is taking place. Solid-state circuitry is used to provide noise-free audio switching with essentially no "clicks" or "pops" added. If desired, a program "dim" rather than a full mute can be implemented by adding two resistors to the Model 2A's circuit board.

Compressor Circuits

The two IFB channels contain studio-quality compressor circuitry to control the dynamic range of the interrupt audio. These play an important role in how the Model 2A maintains high audio quality, specifically evening out level variations presented by the talk signals associated with various IFB users. The compressors make talent cues more intelligible and prevent abnormally high signal levels from reaching user's ears. The resulting audio quality is very, very good.

Telephone Interfaces

The Model 2A contains two telephone interfaces. Both interfaces can be used to bring audio into the Model 2A from the outside world. These two audio signals can be independently assigned as program sources for IFB channels 1 and 2, as well as being used as an audio source for the voice operated (VOX) interrupt function. Each telephone interface has a receive-level trim potentiometer that is accessible via a small hole in the front panel. The large level variations that can be presented by a telephone line can make "on the fly" level trimming a useful feature. In addition to receiving audio, telephone interface 2 can be used to originate an IFB "feed" (IFB output). A switch selects if audio will be received from the outside world, or if audio from IFB channel 1 or 2 will be sent out the interface.

The telephone interfaces contain a unique feature which allows two very different types of telephone "lines" to be correctly interfaced. Each interface can be independently set to operate in either a telephone line mode or a standard audio mode. A telephone line has the profile of being a 2-wire, DC-biased (normally –48 volts) circuit provided by a local telephone company, long-distance carrier, or private telephone system. A standard audio signal could be provided by, for example, a "dry" (no DC voltage provided) fax adapter associated with a cellular telephone.

When an interface is set to the telephone line mode and a telephone line with DC voltage is connected, full monitoring and control is implemented. Each interface contains a switch that allows the telephone line to be answered (taken "off hook") or hung up (placed "on hook"). DC loop current is monitored when the interface is active (off hook). If a telco-provided disconnect signal (a momentary break in loop current) is detected the interface will automatically return to its idle (on-hook) state. Telephone interface 1 contains an LED status indicator that lights whenever loop current is detected. Telephone interface 2 has a status LED that "flashes" when a ringing signal is detected and lights continuously when loop current is detected. Interface 2 also implements an auto answer function which can automatically take the telephone line to the answer (off-hook) state when a ringing signal is detected.

In many cases a "telephone line" in a mobile broadcast application is actually provided by a cellular telephone. This cellular telephone may provide a "dry" (no DC loop current) audio output signal. The standard audio mode was designed expressly to interface with this "cell phone" arrangement. In this mode, the interface's loop current-specific features are disabled, and the interface appears electrically as a transformer-coupled balanced audio interface.

When an interface has been set for the standard audio mode its front-panel line status switch is inactive as is its loop status LED. Also inactive in the standard audio

mode is telephone interface 2's auto answer function. An LED associated with each telephone interface displays when the standard audio mode is selected.

Voice Operated (VOX) Interrupt

The Model 2A contains circuitry to allow an audio signal to serve as both an interrupt audio source and a control signal. This eliminates the need for a separate push-to-talk button or contact closure. The VOX feature allows an audio signal from a remote source, such as a 2-way radio or telephone line, to serve as the interrupt source. The VOX function was optimized for detecting audio signals in the voice band. As voice detection is not a trivial task, great care was taken when designing the circuitry to support this function.

Three signals can serve as the audio source for the VOX interrupt function: receive audio from telephone interface 1, receive audio from telephone interface 2, or the auxiliary audio input. The auxiliary audio input is a separate line-level audio input that is only associated with the VOX interrupt function. A 3-position switch selects which source will be used. A second 3-position switch is used to select which IFB channel is to respond to the VOX interrupt function. The VOX interrupt function can be assigned to only one IFB channel at a time or it can be disabled. Each IFB channel contains an LED indicator light to display when a VOX (voice-activated) interrupt is taking place.

Internal Interrupt Microphone

Contained behind the Model 2A's front panel is an internal interrupt microphone. Associated with the microphone are two switches, allowing the internal microphone to interrupt IFB channel 1, channel 2, or both channels 1 and 2.

Monitor Output

The Model 2A contains a simple but excellent monitor output section. At the core is a 4 watt high-performance audio amplifier designed to drive an 8 ohm (or greater) loudspeaker. (The speaker is optional and is provided as part of an installation.) Associated with the monitor output are a 3-position source select switch and a level control. The switch selects whether IFB channel 1 or IFB channel 2 will be monitored, as well as having an off position. A click-free circuit mutes the monitor output whenever the internal microphone or a Model 22 or Model 24 Access Station is interrupting either IFB channel.

Model 22 Access Station

The Model 22 Access Station and related accessories (all purchased separately) provides the capability for adding up to four additional interrupt locations. Model 22 units are intended to be installed at positions convenient to producers, directors, or other personnel who need to "cue" talent and related personnel. The unit consists of a metal chassis containing two lighted pushbutton switches, unbalanced microphone and balanced line inputs, and status and control circuitry.

Figure 2. Model 22 Access Station Front View

Figure 3. Model 22 Access Station shown mounted in optional Model 25A 19-Inch Rack Adapter with optional Model 11A Gooseneck Microphone

The two high-quality backlit pushbutton switches provide access to the Model 2A's two IFB channels. The lights in the switches display when an interrupt is taking place on its respective channel; lighting brightly when IFB is active and dim when IFB is idle. An input select switch allows connection of a Model 11A Gooseneck Microphone or external line-level signal source. The electronically balanced line-level input allows interfacing with other communications equipment, such as "hot mic" signals from an intercom user station.

The Model 22 can be configured to mute the Model 2A's monitor amplifier output. This function will prevent acoustic feedback from occurring when a Model 22 is located close to the Model 2A's monitor speaker.

Model 22 Access Stations are linked to the associated Model 2A Central Controller via 9-pin D-subminiature female connectors. Each access station contains two connectors, allowing a simple daisy-chain installation. The nine leads carry all signals; audio, control, status lamp (tally), and power. The Model 2A provides all power required by the access stations. The Model 25A 19-Inch Rack Adapter is available to mount a Model 22 and a Model 11A Gooseneck Microphone in one space (1U) of a standard 19-inch rack. The Model 28A Panel Adapter allows a Model 22 and a Model 11A Gooseneck Microphone to be mounted in a panel opening. Refer to Appendix B for details on these optional accessories.

Model 24 Access Station

The Model 24 is similar to the Model 22 with the exception that it works with two Model 2A units. In this way production personnel can access all four of the IFB channels associated with the two Model 2A units. Up to four Model 24s can be connected to each Model 2A. A Model 24 unit consists of a metal chassis that holds five lighted pushbutton switches, audio and control circuitry, and microphone and line input connectors.

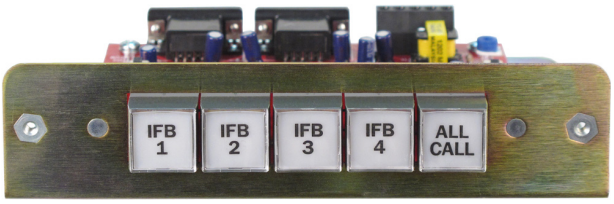


Figure 4. Model 24 Access Station Front View

Each of the four IFB channel pushbutton switches display when an interrupt is taking place on its respective channel. A fifth button is specified as "all call" and lights when pressed. The Model 24 supports connection of an optional Model 11A Gooseneck Microphone or a line-level signal. The latter is transformer-balanced, allowing compatibility with virtually any line-level source. A switch is used to select the interrupt audio

Figure 5. Model 24 Access Station shown mounted in optional Model 27A 19-Inch Rack Adapter with optional Model 11A Gooseneck Microphone

source. A second switch allows the Model 24 to mute the monitor output on each of the Model 2A units whenever an IFB channel is activated.

Model 24 Access Stations connect to the associated Model 2A units using two 9-pin D-subminiature connectors. The nine conductors that link each Model 2A with the Model 24 support all the audio, signaling, and power requirements. No external power source is required. The optional Model 27A allows a Model 24, along with a Model 11A Gooseneck Microphone, to be mounted in one space (1U) of a standard 19-inch rack enclosure. Refer to Appendix B for details on these optional accessories.

Model 32A and Model 33A Talent Amplifiers

Model 32A and Model 33A Talent Amplifiers, purchased separately, are self-contained "beltpack" units that drive talent earpieces or headsets. An audio cable with 3-pin XLR connectors on its ends links the talent amplifiers with a Model 2A. Each Model 32A and Model 33A contains both a male and female 3-pin XLR connector, allowing simple "loop through" connection of multiple units. Up to six of the talent amplifiers can be connected to, and powered by, a single Model 2A Central Controller. On each talent amplifier the audio output signal is provided on both a ¼-inch 2-conductor phone jack and a 3.5 mm output jack. An LED on each unit lights whenever power is present, providing setup assistance and user confidence. Identical in size, each is housed in a lightweight, yet rugged, aluminum housing. A belt clip allows it to be attached to belts, clipboards, scabbards, pizza boxes, production assistants, etc. An optional mounting adapter kit *(Order Code: TAB-01)* is available, allowing a Model 32A or Model 33A to be installed in a permanent location.

The Model 32A is typically used by on-air personnel, and contains a source selection switch, along with an output level control. Either IFB channel 1 or IFB channel 2 can be sent to the talent, along with the desired audio "volume."

Figure 6. Model 32A Talent Amplifier (top) and Model 33A Talent Amplifier (bottom)

The Model 33A is unique in that a “mix” of IFB channels 1 and 2 can be created. Two level controls, along with a source selection switch, allows camera and production personnel to hear IFB cues from either or both channels. This allows IFB signals intended for both production personnel and on-air talent to be simultaneously monitored.

Installation

In this section you will be installing a Model 2A Central Controller in a standard 19-inch equipment rack. In conjunction with the Model 2A, up to four Model 22 or Model 24 Access Stations can be installed. In addition, wiring can be installed for up to a total of six associated Model 32A and Model 33A Talent Amplifiers.

The Model 2A will arrive from the factory configured for compatibility with most applications. However, there are several reasons why you may need to access the “guts” of the unit:

- From the factory, telephone interface 2 is typically configured to automatically answer the telephone line after detecting one ring. Switches can be configured to allow auto-answer to take place after one ring, two rings, four rings, or be disabled (never auto answer).
- From the factory, the Model 2A is set to mute program audio when an interrupt takes place. If desired, a program “dim” function, rather than mute function, can be implemented.

Refer to the Configuration section of this guide for details on revising these conditions and the safety precautions that must be observed.

In addition to these situations, you may want to take a look inside and familiarize yourself with the unit on the rare occasion that it may need service. (The people here in the marketing department taught us never to say a unit may need to be fixed—service is much nicer!) We are proud of how the “guts” of the Model 2A look and how it is constructed so we encourage you to take a “peek”!

On a more serious side, removing the Model 2A’s cover with the AC mains cord connected exposes you to hazardous voltages.

Warning: Never remove the cover without disconnecting mains power. We make the assumption that anyone gaining access to the inside of our products meets the requirements for “qualified and competent service personnel”—including having knowledge of safety precautions.

Locating the Unit

Physical access and mechanical noise are the primary factors when choosing a Model 2A mounting location. You don’t want a cooling fan blowing directly onto the internal microphone, nor do you want the microphone at the level of your belt. It is also a good idea to keep the Model 2A physically separated from other electronic devices that produce strong electrical fields. As a device that contains high gain audio stages, hum and noise pickup is possible through the chassis and associated cabling. Locating the unit away from devices such as power amplifiers, large power transformers, and lighting controls will help avoid pickup of unwanted signals.

Typically interference from outside signals will not be an issue. But precautions were taken in the Model 2A's circuit designs to limit bandwidth, minimizing the chance that EMI and RF pickup problems will occur.

Mounting

The Model 2A is intended for mounting in a standard 19-inch rack, requiring one 1.75-inch rack space (1U). The unit is secured to the rack's front mounting rails using two mounting screws per side.

Program Inputs

The Model 2A allows four line-level program audio sources to be connected. The input circuitry is designed for compatibility with signals that have a nominal level in the range of –10 to +8 dBu, although it's expected that most connected signals will have a nominal level of +4 dBu. A level adjustment trim potentiometer ("trim pot") is associated with each program input. These trim pots are not intended for precise calibration, but strictly to allow the program input signals to be adjusted to the same relative level. A little attention when setting the trim pots will give optimal operational performance. Correctly setting the trim pots will allow an operator, using the front-panel program select switches, to rapidly change the selected program sources while not presenting large changes in level to users listening to the IFB outputs. It is intended that the trim pots will be adjusted only upon initial installation or during maintenance; they are not considered an operator function. Refer to the Configuration section of this guide for details on setting the trim pots.

Connections to the program audio inputs are made by way of the four 3-pin female XLR connectors that are located on the Model 2A's back panel. They are labeled A, B, C, and D, corresponding to labeling on the program selection switches on the front panel. The input circuitry is direct coupled, electronically balanced with an input impedance of 24 k ohms. Prepare cable-mounted 3-pin male XLR connectors such that pin 2 is positive (+ or hot), pin 3 is negative (– or cold), and pin 1 is shield. With unbalanced signals connect pin 2 to positive and pins 1 and 3 to shield.

Auxiliary Audio Input

The Model 2A allows a line-level audio source to be connected and used by the voice operated (VOX) interrupt function. The input circuitry is designed for compatibility with signals that have a nominal level over a range of –10 to +8 dBu. A level adjustment trim pot is associated with the auxiliary input. The pot is not intended for precise calibration, but strictly to allow the AUX input level to be adjusted for correct VOX operation. The trim pot is intended to be adjusted only upon initial installation or during maintenance and is not considered an operator function. Refer to the Configuration section of this guide for details on adjusting the trim pot.

A connection to the auxiliary audio input is made via a 3-pin female XLR connector on the Model 2A's back panel. It is labeled AUX. The input circuitry is direct coupled, electronically balanced with an input impedance of 24 k ohms. Prepare the cable-mounted 3-pin male XLR connector so that pin 2 is positive (+ or hot), pin 3 is negative (– or cold), and pin 1 is shield. With an unbalanced signal connect pin 2 to positive, and pins 1 and 3 to shield.

The VOX interrupt function is quite specialized and may not be used regularly in all applications. For maximum flexibility, it may be best to terminate the auxiliary audio input to a patch point in an audio patch bay. In this way, a variety of audio sources can quickly be "patched in" as the VOX interrupt input source. The VOX feature may remain unused for months or years, but when you need it there's no substitute! The Model 2A's VOX interrupt function performs very well, possibly better than you may think. Try it out and you may soon find more applications than you expected.

Talent Amplifier Output

The talent amplifier output is designed to supply power and two audio signals for up to six Model 32A or Model 33A Talent Amplifiers. Both audio channels maintain 200 ohm impedances which also allows connection of party-line (PL) intercom beltpacks. The talent amplifier output is connected via a 3-pin male XLR connector located on the back panel. Pin 1 is common, pin 2 is 24 volts DC modulated with IFB channel 1 audio, and pin 3 is IFB channel 2 audio. For convenience, it is expected that the talent amplifier output will be wired to a main input/output (I/O) panel, along with microphone, camera, and other related signals. This will allow easy talent amplifier interconnection using standard portable microphone or general audio cables. As a minimum, including one 3-pin male XLR connector on the I/O panel for connecting to talent amplifiers is necessary. But for good operator flexibility it would be better to include two or three connectors that are "multed" from the Model 2A's talent amplifier output. Also note that each Model 32A and Model 33A Talent Amplifier has both a female and a male 3-pin XLR connector. This allows talent amplifier interconnecting cables to be "looped" through one talent amplifier and then on to another. This will simplify and, in most cases, reduce the amount of cabling required to connect multiple talent amplifiers to a Model 2A.

Line Outputs

Associated with each of the two IFB channels is a level output with a nominal signal level of +4 dBu. The line outputs are electronically balanced, capacitor-coupled and designed to drive balanced loads with a minimum impedance of 2 k (2000) ohms. Each line output exits the Model 2A via a 3-pin male XLR connector. Prepare the cable-mounted 3-pin female XLR connectors so that pin 2 is positive (+ or hot), pin 3 is negative (– or cold), and pin 1 is shield. To connect to an unbalanced load connect pin 2 to positive (+ or hot) and pin 3 to shield; do not short (connect) pin 3 to pin 1.

Some installations may use the line outputs to drive wireless IFB transmitters. In other installations they may be used for special applications such as feeding a satellite uplink. For maximum flexibility it is recommended that the line outputs be wired via audio patch points, even if the initial installation doesn't require it.

The Model 2A's audio quality and flexibility make it a useful tool for non-IFB applications. The Model 2A's sonic quality is as good as many audio consoles, storage devices, etc. This makes using an IFB channel as a 4-input/1-output audio source selector for an uplink application completely valid. Let the Model 2A become a useful part of your facility's "bag of tricks!"

Connecting Telephone Lines

Words of Caution: As with any product, installing the Model 2A requires a safety-first approach.

Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch non-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

The Model 2A contains two telephone interfaces which can be individually configured to allow connection to a telephone line or to a standard audio signal. A telephone line is designated as such if it has a DC voltage (typically –48) associated with it. This type of telephone line is sometimes referred to as being a “wet” line. A standard audio signal is one that is isolated from any source of DC voltage. Some fax adapters associated with cellular telephones provide this type of “telephone” line. A standard audio signal is sometimes referred to as a “dry” signal. While this sounds confusing, contemporary applications sometimes refer to both types of signals as “telco.” To a large production vehicle that pulls up to do a 2-week golf tournament, a telco line often is one provided by the local telephone company terminated on an RJ11 jack. To a mobile news gathering (“ENG”) vehicle, a telco signal might come from an adapter associated with a cellular telephone which in many cases is simply a standard audio signal.

Here is a review of the important features of the Model 2A’s telephone interfaces:

Interface 1

- Telephone line or standard audio mode select switch on back panel
- Used to receive audio only
- Receive audio can be used as program and VOX source
- Front-panel ±8 dB receive level trim pot
- Front-panel switch allows manual answer and hang-up (telephone line mode)
- Auto disconnect upon telco-provided break in loop current (telephone line mode)
- Operating mode and loop current status LEDs

Interface 2

- Telephone line or standard audio mode select switch on back panel
- Used to receive or send audio
- Receive audio can be used as program and VOX source
- Front-panel ±8 dB receive level trim pot
- Sends audio from either IFB channel
- Automatic answer of “ringing” telephone line (telephone line mode)
- Auto disconnect upon telco-provided break in loop current (telephone line mode)
- Front-panel switch allows manual answer and hang-up (telephone line mode)
- Operating mode and ring activity/loop current status LEDs

Setting the mode switches and connecting signals is quite easy. Set the telephone interface mode switches, located on the back panel, to the desired mode—either telephone line or standard audio. Use modular telephone cables to connect to the Model 2A's RJ11 jacks. Technically, the Model 2A's telephone interfaces use 6-position modular jacks with pins 3 and 4 used for the actual electrical connections.

If the telephone line mode is selected, the Model 2A's telephone interface connections should, in most cases, terminate on an I/O panel of some type. This will allow rapid connection with telephone company-provided lines. Because of the presence of high-voltage ringing signals, it is strongly advised to not route telephone lines through an audio patch bay.

If the standard audio mode is selected direct connections to a source device is acceptable. But connecting them via audio patch points will provide better flexibility. In the standard audio mode the interface looks like a transformer coupled audio input. Interface 1 has an input impedance of 2200 ohms. Interface 2 has an input impedance of 2200 ohms in the receive mode and 700 ohms in the send mode. In standard audio mode, the interfaces are compatible with balanced or unbalanced signals. No shield connection is associated with the telephone interfaces. If possible, audio signals should be connected to the Model 2A's telephone interfaces, via a modular plug and cable, using shielded cable, with the shield wire connected to the appropriate point at the end opposite of the Model 2A. The shield wire should remain unterminated at the Model 2A's end.

The telephone interfaces were designed to receive and, in the case of interface 2, send audio signals at a nominal level that is correct for telephone circuits. (This nominal level is far lower than the typical +4 dBu professional audio standard.) The receive signal level is expected to be approximately –15 dBu and the transmit level approximately –6 dBu. Trim pots, accessible on the front panel, are associated with each telephone interface. This allows the receive level to be adjusted over a ±8 dB range. Special precautions may need to be taken when an interface is set for standard audio mode and +4 dBu signals are going to be connected. Including an audio attenuator or "pad" with a value of somewhere between 10 and 20 dB in series with the source signal will optimize the receive audio level. In addition, using a line amplifier or other gain stage to achieve a higher send level from telephone interface 2 may be helpful.

Model 22 Access Stations

The Model 2A allows the connection of up to four Model 22 Access Stations. The Model 22 provides an unbalanced microphone input, a balanced line-level input, two lighted pushbutton switches, and related circuitry. Power is provided by the Model 2A so an external power source is not required. A cable with 9-pin D-subminiature male (DE-9M) connectors on each end links a Model 2A Central Controller with the first Model 22 Access Station. Identical cables are used to interconnect up to three additional Model 22 units in a daisy-chain fashion. A 5-position screw terminal strip, located on the rear of the Model 22, allows connection of either a Studio Technologies' Model 11A Gooseneck Microphone or a line-level audio signal.

Mounting Methods

There are three mounting methods appropriate for the Model 22: the Model 25A 19-Inch Rack Adapter, the Model 28A Panel Adapter, or a custom implementation. The Model 25A 19-Inch Rack Adapter allows a Model 22 and a Model 11A Gooseneck Microphone to be mounted in a single space (1U) of a standard 19-inch rack. Refer to Appendix A for details on how the Model 22 is physically positioned in the Model 25A 19-inch Rack Adapter. Plenty of room remains on the right side of the rack adapter plate, allowing the addition of custom switches, lights, or jacks as your installation may require. (Of course any modifications will have to be implemented by installation personnel.)

The Model 28A Panel Adapter allows the installation of a Model 22 and a Model 11A Gooseneck Microphone in a "cut out" made in a desk, console, or other enclosure. Refer to Appendix A for a mechanical drawing of the panel adapter and the required dimensions of the mounting opening.

A custom Model 22 installation is any application where installation personnel devise an alternative mounting method. Refer to Appendix A for a mechanical drawing showing detailed dimensions of the Model 22.

Interconnect Wiring

Contained on both the Model 2A and the Model 22 are 9-pin D-subminiature female (DE-9F) connectors. A "straight through" cabling scheme links the units together, with pin 1 connected to pin 1, pin 2 to pin 2, etc. Shielded cable is required as the two audio buses linking the Model 22 units to a Model 2A are unbalanced. The shield should be connected to pin 1 on the 9-pin plugs. For reference, the following chart displays the signals associated with the access station connector:

Pin #	Function
1	Common/Shield
2	Interrupt Audio, Ch 1
3	Interrupt Audio, Ch 2
4	18 volts DC
5	Interrupt Control, Ch 1
6	Interrupt Control, Ch 2
7	Lamp Voltage, Ch 1
8	Lamp Voltage, Ch 2
9	Monitor Output Mute Control

Note:
Connector type on Model 2A is a 9-pin D-subminiature female (DE-9F). Installer must provide a 9-pin D-subminiature male (DE-9M). Connector uses 4-40 threaded inserts for locking with mating plug.

Figure 7. Model 22 Access Station Connections

For ease of installation, each Model 22 contains two 9-pin D-subminiature female connectors (DE-9F). The pins on both connectors are wired in parallel ("multed"). This allows signals to be easily "looped through" on their way to the next Model 22. For short cable runs, standard 9-pin video monitor extension cables, commonly used with older-style personal computers, are an inexpensive way to link a Model 22 with a Model 2A. Ensure that any cable assemblies you purchase use shielded cable, with the shield connected at pin 1 of both plugs.

For optimal audio performance a maximum total cable length of 500 feet can used to link Model 22 units to the Model 2A. But minimizing the cable length will reduce the total exposure that the unbalanced audio buses will have to noise pickup, etc. Cable

runs longer than 500 feet are possible but should be carefully checked for correct operation.

It's come to the factory's attention that some installers have been effectively using standard Ethernet cables to link Model 22 units with Model 2A units. They start by using adapters that convert 9-pin D-subminiature connectors to RJ45 (8-pin module) jacks. Then they select or create standard Ethernet cables to support the cable "run." There is one downside in that these cables will only support eight signals and not the complete nine used by the Model 22 and Model 2A. Physical pins 1-8 will be connected but not pin 9. This will implement all functions except the Model 22's ability to mute the Model 2A's monitor speaker output. This is because pin 9 of the D-subminiature connector enabled this function. If the installation doesn't require muting of the monitor output speaker in response to Model 22 IFB activity then this installation may prove worthwhile.

Talk Audio Source

A source of talk audio must be connected to the Model 22. A gooseneck microphone, available as an option from Studio Technologies, will often be used with a Model 22. Alternately, a source of line-level audio can be connected. A 5-position screw terminal strip is used to connect signals to the mic and line inputs. The mic input is configured only for use with unbalanced electret microphones. The + terminal on the mic input provides current limited 5 volts DC to power the electret microphone. The – terminal is connected to the microphone's low signal lead. The connection marked SHLD is intended for the shield wire of the microphone cable; it doesn't carry signal.

The Studio Technologies' Model 11A Gooseneck Microphone is an unbalanced electret type, requiring an external source of DC power. The microphone utilizes a ¼-inch 3-conductor plug for interconnection. The tip lead brings DC power to the microphone, as well as having microphone audio superimposed on it. The ring lead is microphone common. The sleeve lead is a shield connection.

Included with the Model 11A is a mounting hardware kit. This kit contains a ¼-inch 3-conductor jack used to mate with the microphone's plug. At the factory a 3-conductor wiring harness assembly is attached to the jack. The wiring harness has a red-colored wire, a black-colored wire, and a shield wire. One end of the red wire is attached at the factory to the tip connection on the jack. The other end should be connected to the + terminal on the Model 22's terminal strip. One end of the black-colored wire is attached at the factory to the ring lead of the jack. The other end should be attached to the – terminal on the terminal strip. One end of the shield connection is attached at the factory to the sleeve of the jack. The other end should be attached to the SHLD terminal on the Model 22's terminal strip. It's important to note that a dynamic microphone must not be connected to the mic terminals; it won't provide the correct signal level and damage to the mic may occur.

An external source of talkback audio can be connected to the Model 22's terminal strip. A possible source of this audio would be a "hot mic" output of an intercom user station. The line input circuit is electronically balanced, capacitor coupled, with an input impedance of 24 k ohms. Balanced or unbalanced signals can be connected.

An input level trim pot allows signals with a nominal level range of –15 to +10 dBu to be correctly interfaced. When connecting a balanced audio signal it should be connected to the terminal strip's + and – terminals. The shield wire can be connected to the SHLD screw terminal associated with the mic input. Unbalanced signals may require a bit more attention for correct operation. The signal high lead should be connected to the + terminal. The signal low/shield wire should connect to both the – terminal and the SHLD terminal. Failure to make this dual connection can result is large amounts of hum being induced into the interrupt signal.

Selecting the Operating Modes

Two slide switches are used to select the Model 22's operating modes. The input select switch allows either the mic input or the line input terminals of the 5-position terminal strip to be active. In most cases a Studio Technologies' Model 11A gooseneck microphone has been connected. In this case the switch should be set to its MIC position. If you have connected a signal to the line input terminals, set the switch to its LINE position. When the Model 22 is using the line input as its interrupt audio source an audio trim pot is active. Adjust that trim pot only after installing the entire IFB system. Refer to the Configuration section of this guide for details on how to set the trim pot.

The Model 22 contains a monitor mute function which is intended to prevent acoustical feedback from a loudspeaker associated with the Model 2A's monitor output. When the monitor mute switch is set to its ON position, the monitor output will be muted whenever an interrupt (one or both of the IFB buttons is pressed) on that access station. When the switch is set to its OFF position an interrupt from that specific Model 22 will not cause the monitor output to mute.

Model 24 Access Stations

Up to four Model 24 Access Stations can be connected to two Model 2A units. In this way the Model 24 units can provide remote access to the four IFB channels associated with the two Model 2As. One cable, terminated with a male 9-pin D-subminiature connector (DE-9M) on each end, links the Model 24 with the Model 2A designated to provide IFB channels 1 and 2. A second identical cable links the Model 24 with the Model 2A designated to provide IFB channels 3 and 4. Each Model 24 has an unbalanced microphone input, a balanced line-level input, five lighted pushbutton switches, and related circuitry to access the four IFB channels. Power is provided by the Model 2A units; an external power source is not required. A 5-position screw terminal strip allows connection of an optional Studio Technologies' Model 11A Gooseneck Microphone or a line-level signal.

The Model 24 can be mounted using either the Model 27A 19-Inch Rack Adapter or a custom panel cutout. The Model 27A 19-Inch Rack Adapter allows convenient installation of a Model 24 and a Model 11A Gooseneck Microphone into one space of a standard rack enclosure. Refer to the mechanical drawing in Appendix A for details. Plenty of room remains on the right side of the rack adapter panel, allowing the addition of custom switches, lights, or connectors as the specific installation may require.

A custom Model 24 installation is defined as any installation where you devise the mounting method! Refer to Appendix A for a mechanical drawing showing the dimensions of the Model 24. This will assist you

in implementing your own mounting method.

The Model 24 contains two 9-pin D-subminiature connectors (DE-9F). One is designated to connect to the Model 2A that provides IFB channels 1 and 2 (unit # 1). The other connects to the Model 2A designated for IFB channels 3 and 4 (unit # 2). Contained on the Model 2A is a 9-pin D-subminiature female connector (DE-9F) that is used to connect to the access stations. A “straight through” cabling scheme links the Model 24 units to the Model 2A units, with pin 1 connected to pin 1, pin 2 to pin 2, etc. Shielded cable is required as the audio buses linking a Model 24 to the Model 2As are unbalanced. The shield should be connected to pin 1 on the DE-9M connectors. For reference, the chart shown in Figure 8 displays the signals associated with the access station connector:

For best performance, a maximum total cable length of 500 feet should be used to link Model 24s to the Model 2As. Minimizing the cable length reduces the total exposure the unbalanced audio buses have to noise pickup, etc. Cable runs longer than 500 feet are possible but should be carefully checked for correct operation.

If more than one Model 24 is going to be installed some method of “multing” or “splitting” the 9-pin D-subminiature connectors will have to be provided. The simplest method is to use a short section of ribbon cable and multiple 9-pin insulations-displacement (IDC) connectors. Depending on the specific installation, the “break out” assemblies can be connected directly to the access station connectors on the Model 2A units, or can be “downstream” at one of the Model 24s.

Pin #	Function
1	Common/Shield
2	Interrupt Audio, Ch 1 (Model 2A # 1) or Ch 3 (Model 2A # 2)
3	Interrupt Audio, Ch 2 (Model 2A # 1) or Ch 4 (Model 2A # 2)
4	18 volts DC (Model 2A # 1 and Model 2A # 2)
5	Interrupt Control, Ch 1 (Model 2A # 1) or Ch 3 (Model 2A # 2)
6	Interrupt Control, Ch 2 (Model 2A # 1) or Ch 4 (Model 2A # 2)
7	Lamp Voltage, Ch 1 (Model 2A # 1) or Ch 3 (Model 2A # 2)
8	Lamp Voltage, Ch 2 (Model 2A # 1) or Ch 4 (Model 2A # 2)
9	Monitor Output Mute Control (Model 2A # 1 and Model 2A # 2)

Note:
Connector type on Model 2A is a 9-pin D-subminiature female (DE-9F). Installer must provide a 9-pin D-subminiature male (DE-9M). Connector uses 4-40 threaded inserts for locking with mating plug.

Figure 8. Model 24 Access Station Connections

The Model 24 Access Station contains two mode switches that must be set. The input select switch allows the unit to be set for compatibility with a mic input or a line-level input. In many cases the Model 11A Gooseneck Microphone, available as an option from Studio Technologies, will be used with a Model 24. Setting the switch to the MIC position activates the mic input terminals. The mic input is configured only for use with unbalanced electret microphones. The + terminal on the mic input provides current limited 5 volts DC to power the electret microphone. The – terminal is connected to the microphone’s low signal lead. The connection marked

SHLD is intended for the shield wire of the microphone cable; it doesn't carry signal. A dynamic microphone must not be connected to the mic terminals; it won't provide the correct signal level and damage to the mic may occur.

The Model 11A Gooseneck Microphone is an unbalanced electret type, requiring an external source of DC power. The microphone utilizes a ¼-inch 3-conductor plug for interconnection. The tip lead brings DC power to the microphone, as well as having microphone audio superimposed on it. The ring lead is microphone common. The sleeve lead is a shield connection. Included with the Model 11A is a mounting hardware kit. This kit contains a ¼-inch 3-conductor jack used to mate with the microphone's plug. At the factory a 3-conductor wiring harness assembly is attached to the jack. The wiring harness has a red-colored wire, a black-colored wire, and a shield wire. One end of the red wire is attached to the tip connection on the jack. The other end should be connected to the + terminal on the Model 24's microphone input. One end of the black-colored wire is attached to the ring lead of the jack. The other end should be connected to the – terminal on the Model 24's microphone input. One end of the shield connection is attached to the sleeve of the jack. The other end should be connected to the SHLD terminal on the Model 24's microphone input.

Setting the input select switch to the LINE position activates the line input and the associated input trim potentiometer. The line input circuit is balanced, transformer coupled, with an input impedance of 40 k ohms. Balanced or unbalanced signals can be connected. The input trim pot allows signals with a nominal level over the range –15 to +10 dBu to be correctly interfaced. When connecting balanced signals the audio should connect to the + and – terminals. The shield wire can be connected to the SHLD terminal associated with the mic input. Unbalanced signals can be connected so that the signal high lead is connected to the + terminal and the signal low/shield lead connects to the – terminal. If this results in hum or noise it's possible that improvements will be found by connecting the low/shield lead to both the – and the SHLD terminals. If you have connected a signal to the line input terminals, set the trim pot only after installing the entire IFB system. Refer to the Configuration section of this guide for details on setting the trim pot.

The Model 24 contains a monitor mute function, which is intended to prevent acoustical feedback if the access station is located close to a monitor loudspeaker associated with the Model 2A Central Controller's monitor output. When the monitor mute switch is set to its ON position, the monitor outputs mute whenever an interrupt occurs from that access station. Set the switch to its OFF position if muting of the monitor output is not desired.

Monitor Output

The Model 2A contains a monitor amplifier which is intended to drive a small, efficient loudspeaker. A loudspeaker is not provided with the Model 2A and one must be obtained for each installation. A switch on the front panel selects whether IFB channel 1 or 2 will be monitored. The monitor output is accessible from the back panel using a ¼-inch 2-conductor jack. The output has a maximum power of 4 watts RMS, can drive 8 ohm or greater loads, and is quite

"hi-fi." Ensure that both conductors of the speaker wiring are "floating" (isolated) from ground. This will prevent ground loops that could cause oscillation or other strange audio gyrations. We recommend using a good quality loudspeaker. If you do so we think you'll find the monitor output sounds quite nice. In our lab, we tested the monitor amp by connecting it to a JBL® 2-way speaker cabinet, with a compact disc acting as our program source. The amp, within reason, really "kicked some tail!"

Connecting AC Mains Power

The Model 2A operates directly from AC mains power of 100 to 240 volts, 50/60 hertz, 24 watts maximum. As a "universal mains input" device, there are no switches to set or jumpers to install. A 3-pin IEC 320 C14 inlet connector on the back panel mates with a detached mains cord set.

All units are supplied with an AC mains cord that has a North-American (NEMA 5-15L) standard plug on one end and an IEC 320 C13 connector on the other end. Units bound for other destinations require that the appropriate cord set be obtained. The wire colors in the mains cord should conform to the internationally recognized color code and be terminated accordingly:

Connection	Wire Color
Neutral (N)	Light Blue
Line (L)	Brown
Earth/Ground (E)	Green/Yellow

Because the Model 2A does not contain a power on/off switch it will begin operation as soon as AC mains power is connected. To confirm that the Model 2A is operating the LED indicator labeled POWER will light. This LED is located on the far-right side of the front panel.

Safety Warning: The Model 2A does not contain an AC mains disconnect switch. As such, the AC mains cord plug serves as the disconnection device. Safety considerations require that the plug and associated inlet be easily accessible to allow rapid disconnection of AC mains power should it prove necessary.

Operation

The Model 2A's Front-Panel Controls and Indicators

If you value equipment by the number of switches and lights per rack space, the Model 2A is really a standout—there is more stuff crammed onto the front panel than we thought possible! Seriously, the designers had the difficult problem of getting maximum functionality into a single rack space. They had heated arguments about the feature list, what to include, what to delete. In the end, we feel that all important features were included. Once you understand all the functions, we think you'll find the Model 2A quite powerful, yet easy and intuitive to use.

Looking at the Model 2A's front panel from the left to the right, you should note the functional groups: internal interrupt microphone, channel 1-related items, channel 2-related items, voice activated (VOX) interrupt, telephone interface 1, telephone interface 2, monitor output, and power LED. We'll discuss these groups in the following sections.

Internal Interrupt Microphone

The Model 2A contains an internal microphone which can be used to access the

Figure 9. Detail of Model 2A Central Controller Front Panel

IFB channels. Two momentary action pushbutton switches are located on the left end of the front panel and are labeled IFB 1 and 2. Pressing either switch mutes program audio, mutes the monitor speaker output, and connects the front-panel microphone to the selected IFB channel(s). The red IFB status LED associated with each channel will light whenever its corresponding IFB button is pressed. Notice that sound enters the microphone via the small openings in the front panel above and slightly to the right of the switches.

Program Select, Level Adjustment, and Indicators

Two identical sets of controls and indicators serve IFB channels 1 and 2. Each channel contains six program select switches, two status LEDs, a program level control, and a 5-segment LED level meter. The six switches are used to select which of the four program inputs and two telephone interface receive audio sources will serve as the program audio source(s). The switches were designed to allow more than one source to be selected at a time. The ability to simultaneously depress and lock multiple buttons is not a defect but rather a feature which can be useful in special circumstances.

The red LED, labeled IFB, is lit any time program audio is being interrupted. There are three ways an interrupt can take place: by the internal microphone being activated, by a Model 22 or Model 24 Access Station being used, or via a control signal from the voice operated (VOX) interrupt function. The yellow LED, labeled VOX, is lit any time an interrupt condition is caused by the VOX function.

The program level control allows the program audio signal to be adjusted relative to the interrupt audio level. The interrupt level is internally fixed and serves as the reference. The gain structure was configured so that the level control set for about 70 percent of rotation (the “2-o’clock” position) will give a program level approximately equal to the interrupt level. This statement is made under the assumption that a +4 dBu program signal is selected and its associated input trim pot is correctly set.

The 5-segment LED level meter displays the internal level of the composite (program and interrupt) IFB signal. The three green LEDs are lit when the signal level is in the normal operating range. The yellow LED will light when signal level are slightly higher than average. The red LED lights when signal levels reach the “headroom” area. The ballistics of the meter is a cross between that of a VU meter and a peak (PPM) meter. (We affectionately refer to it as a “PU” meter!) The meter should prove useful during installation and maintenance, as well as during normal operation.

A typical interrupt signal will light the green LEDs, with peaks lighting the yellow LED. The internal compressor circuit will keep most interrupt signals from lighting the red

LED. When an interrupt is not taking place the level meter will reflect the level of the program audio source. Setting the program level control to occasionally light the yellow LED will give a program level approximately equal to the interrupt level.

Voice Operated (VOX) Interrupt

The Model 2A contains a specialized function that allows an audio signal to automatically interrupt the program signal. By contrast, using the Model 2A's internal microphone requires an explicit action by the operator, i.e., pressing a button to cause an interrupt. In some cases, this explicit action is simply not possible. An example would be a director giving cues via a 2-way radio or a telephone line. The VOX circuitry creates an interrupt control signal by detecting energy in the voice band. This control signal acts on the selected IFB channel, interrupting program audio and routing VOX audio in its place. The VOX interrupt can be assigned to either IFB channel 1 or IFB channel 2, but not to both simultaneously.

The VOX interrupt function is only sophisticated from an internal-circuitry stand point. Operation is quite simple, with only two switches to set. The input switch is used to select which of the three possible audio sources are to be used by the VOX circuit: audio from the auxiliary audio input, receive audio from telephone interface 1, or receive audio from telephone interface 2. The output switch is used to select whether the VOX interrupt function is off (not used), assigned to interrupt channel 1, or assigned to interrupt channel 2. VOX operation can commence as soon as the output is assigned to one of the IFB channels. VOX interrupt activity can be noted by observing the yellow VOX LED associated with the assigned IFB channel.

Telephone Interface 1

Two status LEDs, one switch, and one trim potentiometer are associated with telephone interface 1, labeled TELCO 1. The yellow LED, labeled STD, is lit whenever the interface is set for the standard audio mode by the switch on the back panel. The red LED, labeled LC for loop current, lights any time the interface is set for the telephone line mode and DC current is flowing through the interface.

The interface control switch, active only in the telephone line mode, allows the interface to be answered (taken "off hook") or hung up (placed "on hook"). Momentarily pressing the switch to its up position, labeled ANSWER, places the interface in its active or off-hook state. If loop current is detected, the interface will stay in its off-hook state and the loop current LED will light. If loop current is not detected, the interface will return to its off-hook (idle) state after a few seconds. Momentarily pressing the switch to the down position, labeled HANG UP, immediately disconnects the interface from the telephone line.

Telephone line audio signals can vary greatly in level on a call-by-call basis. To counter this problem, a level trim potentiometer is provided for the operator, allowing adjustment over a ±8 dB range. A quiet signal can be boosted, and a "hot" signal can be attenuated. The trim pot is accessible via a small hole in the front panel, directly to the right of the interface control switch. Using an Xcelite® "greenie" straight-blade screw driver is recommended.

Telephone Interface 2

Two status LEDs, two switches, and one trim potentiometer are associated with telephone interface 2, labeled TELCO 2. The yellow

LED, labeled STD, is lit whenever the interface is set for the standard audio mode by the switch on the back panel. The red LED, labeled RING/LC indicates two conditions. It will flash rapidly when the interface is set for telephone line mode and ringing energy is detected on the telephone line. It will light continuously any time the interface is set for the telephone line mode and DC current is flowing through the interface. DC current flowing would, of course, indicate that the telephone line is off hook and is being controlled by the Model 2A.

The interface control switch, active in the telephone line mode, allows the interface to be answered (taken “off hook”) or hung up (placed “on hook”). Momentarily pressing the switch to its up position, labeled ANSWER, places the interface in its active or off-hook state. If loop current is detected, the interface will stay in its off-hook state and the loop current LED will light. If loop current is not detected, the interface will return to its on-hook (idle) state after a few seconds. Momentarily pressing the switch to down position, labeled HANG UP, disconnects the interface from the telephone line.

A second switch controls the audio routing through telephone interface 2. In the center position, labeled RCV, audio is received from telephone line 2. In the up position, labeled SEND CH1, IFB channel 1 audio (program and interrupt audio) is sent out the interface. In the down position, labeled SEND CH2, IFB channel 2 audio (program and interrupt audio) is sent out the interface. The overall send level is not adjustable. Just like the talent amplifier and line outputs, the interrupt level is fixed and the program level is adjusted in reference to it. The send level has been internally configured to give the highest signal level possible without overloading the telephone company equipment.

On interface 2 a level trim pot is also provided allowing the receive audio to be adjusted over a ±8 dB range. A quiet signal can be boosted and a “hot” signal can be attenuated. The trim pot is accessible via a small hole in the front panel, directly to the right of the routing control switch. Using an Xcelite® “greenie” straight-blade screw driver is recommended. Note that the trim pot is active only in the receive mode.

Monitor Output

A level control and source select switch is associated with the monitor output section. The level control adjusts the output level sent to the monitor speaker output. IFB channel 1 is monitored when the source select switch is in its up position. In its down position, channel 2 is monitored. The middle position is labeled OFF and the monitor amplifier is, as you might guess, off!

Applying Power

Upon mains power being applied to the Model 2A the unit will go through a power-up sequence that will light all of the meter and status LEDs in a test pattern. Then the levels meters are used to momentarily display the version number of the internal firmware (embedded software that runs in a microcontroller integrated circuit). The meter associated with channel 1 will display the major version number with a range of 1 to 5 starting at the bottom LED and moving up. The meter associated with channel 2 will display the minor version number, also with a range of 1 to 5. The version number will display for

approximately one second after which normal operation will commence. At this stage the power LED on the Model 2A and any connected Model 32A and/or Model 33A Talent Amplifiers should be lit. If one or more Model 22 or Model 24 Access Stations have been connected, their push-button switches should be dimly lit.

It's Time to Use the System!

Operation can commence after the Model 2A and related equipment have been installed and interconnected. Any changes required to the Model 2A's internal configuration should have been made, following the information provided in the Configuration section of this guide. Mains power should be applied and the power LED should be lit. Note that the Model 2A's power LED also provides an indication of a second condition. If the talent amplifier output goes into its fault mode (typically due to excessive current being drawn) the power LED will flash on-and-off until the condition has been corrected.

In the following paragraphs we'll describe several scenarios you can use to try out some of the Model 2A's features.

Program Inputs, Meters, and Monitor Output

Connect a high-quality audio source, e.g., personal audio device or off-air receiver, to one of the program inputs. Select this input as the program audio source for one of the IFB channels. Set the program level control of that IFB channel such that the yellow LED lights on signal peaks. Test the monitor output by selecting the appropriate IFB channel and setting the rotary level control. You should hear the problem source and it should let you "rock out" pretty well. If not, put in a maintenance request for a better speaker!

Internal Interrupt Microphone

Press the IFB buttons on the left side of the Model 2A's front panel to activate the internal microphone. To prevent possible acoustical feedback the monitor output will mute. Using the meters, observe that pressing one of these buttons will cause the program audio source to mute, replaced with signal coming from the internal microphone. The level of the local interrupt audio signal is controlled using the compressor circuits. No user level controls are provided.

Talent Amplifiers

Connect an earpiece to an associated talent amplifier. (The Models 32A and 33A Talent Amplifiers provide their audio output signals on a ¼-inch 2-conductor phone jack and a 3.5 mm output jack.) Carefully adjust the level control, starting at the fully counterclockwise position. You should be able to hear the program audio and, when a front-panel IFB button is pressed, interrupt audio.

On the Model 32A, a switch allows either IFB channel to be selected as the audio source. On the Model 33A, either or both IFB channels can be selected as the audio source(s). The level control(s) should be adjusted for the desired level during an interrupt from the Model 2A's internal microphone. Then the program level should appear at the correct level. (If not, adjust the relevant program level control on the Model 2A.) Note that the even when the headphone level control on the Model 32A or 33A is set to its fully counterclockwise position, the audio output will not be fully "off." This ensures personnel will

never (hopefully!) miss an important cue because a level control was accidentally turned “off.”

VOX IFB Operation

To test the VOX interrupt feature, bring an audio source into the auxiliary audio input. Set the VOX input switch to the middle position, labeled AUX, which routes the auxiliary audio input to the VOX circuitry. Use the VOX output switch to assign the VOX output to one of the IFB channels. On the channel you selected for VOX interrupt watch the VOX and IFB status LEDs light when signal is detected. Use the monitor output to listen to VOX interrupt activity.

Telephone Interface 1

As an introduction to telephone interface 1, begin by receiving audio via the interface. Use this audio signal as a program audio source. The receive level trim pot can be used to adjust the level of the audio signal. (An Xcelite “greenie” screwdriver works great.) Try using the receive audio from telephone interface 1 as a source for the VOX interrupt function.

Telephone Interface 2

Telephone interface 2 has two additional features: the ability to send IFB audio and auto answer. It can be worthwhile to experiment with using these features. Telephone interface 2 allows audio from either of the IFB channels to be sent out the telephone interface. Use the audio routing switch to send IFB channel 1 or IFB channel 2 audio out the telephone interface. Also, try out the process of receiving audio from the interface, using it as a program or VOX audio source.

When telephone interface 2 is set for the telephone line mode the RING/LC LED will flash on and off whenever ringing energy is present on the connected telephone line. Depending on the selected configuration the interface may automatically answer in response to a ringing signal. The configuration choices are to answer after one, two, or four rings or not to auto answer at all. From the factory the typical setting is to answer after one ring. When configured for auto-answer the interface will answer one second after the end of the selected number of “rings.

Access Stations

It’s important to thoroughly test all connected Model 22 and/or Model 24 Access Stations. Is the interrupt audio loud and clear? Observe the status lamps inside the push-button switches. Do the appropriate lamps light fully bright when an interrupt takes place? If an access station is configured to mute the Model 2A’s monitor output, ensure that the monitor speaker mutes during interrupt activity.

Audio Quality

In all cases, you should hear clear, click-free audio. We intended the Model 2A to sound great—if not, call us for technical help. A completed installation should be reliable, easy to use, and perform to high sonic standards. Questions and comments from the field are welcomed and encouraged!

Operating Notes

Talent Amplifier Output

Should the Model 2A’s talent amplifier output experience a fault condition the power LED will flash on and off. Technically this

will occur when the DC on pin 2 of the talent amplifier output falls below a threshold voltage. Once the fault is removed the LED will again light continuously. A fault will occur when an excessive load (greater than 250 milliamperes) is presented to the output, typically due to too many user devices being connected. A shorted interconnect cable can also cause the output to go into its fault condition.

While the fault condition is not desirable, it's actually a protection feature. Model 2A circuitry, under microcontroller integrated circuit control, monitors the output voltage. If it falls below a threshold the output DC is cycled on and off to protect the circuitry. Leaving the output enabled continuously during a fault condition would cause stress to the components and possibly lead to damage. Once the fault condition has been removed the talent amplifier output will return to normal operation.

Using Party-Line Intercom Beltpacks

While the Model 2A's talent amplifier output can be used to power and send audio to listen-only user beltpacks, such as the Models 32A and 33A, it's actually a "mini" party-line (PL) power supply. It provides 24 volts DC from pin 2 to pin 1 and 200 ohm termination impedances from pin 2 to pin 1 and from pin 3 to pin 1. This allows 2-channel PL user beltpacks, such as the popular RTS® BP325, to be connected. (Up to three BP325 units can be easily supported by the talent amplifier output's maximum of 250 milliamperes of current.) Users of these PL beltpacks could communicate with each other on the two channels as well as hearing audio from the Model 2A's IFB channels. A little extra flexibility, such as this PL capability, can prove useful in special circumstances!

Configuration

Setting the Program Input Level Trim Pots

Trim pots have a range of –4 to +14 providing a compatible range of –10 to +8 dBu. There is no hard and fast rule on how to best adjust the trim pots associated with the four program inputs. As mentioned in the Installation section of this guide, the trim pots are provided to allow the relative levels of the program input signals to be adjusted so as to roughly match each other. This will allow minimal level changes when an operator switches between the four program inputs. A simple method of "calibrating" the program input trim pots is to:

1. Begin by connecting an audio level meter to the line output of IFB channel 1. The meter will connect by way of an interface cable that provides a 3-pin male XLR. Set the meter to display the audio signal level in terms of dBu, i.e., level in dB referenced to 0.775 volts RMS with no defined load impedance.
2. Set the front-panel program level control associated with IFB channel 1 to the "2-o'clock" position (70 percent of rotation).
3. Set the four program level trim pots, accessible by way of holes in the back panel, to their center (50% of their rotation) position.
4. Activate the four program sources such that they are providing signals at their normal operating level. To clarify, send signals from these four sources, at their normal levels, to the four Model 2A program inputs. These signals can be in the form of alignment tones or actual program material.

5. Use the front-panel program select switches to select, one at a time, the four program inputs. The line output should give an output level of +4 dBu nominal, with +8 to +12 dBu probable on peaks. The actual output level is not important and a lower level is much better than a “hotter” average level.
6. After observing the relative strengths of the four sources, use one or more of the trim pots, if required, to get an equal average level from the four sources.
7. If you don’t have an audio level meter handy, or if you’re not concerned about exact calibration, use one of the LED level meters on the front panel to set the trim pots. Actually, if your ears are pretty good use them, and no meters, to set the trim pots to get equal levels. That’s what we would do if we were in the field! Confirm your subjective adjustment with the LED meter and you should be set.

Setting the Line-level Trim Pot on the Model 22 and Model 24 Access Stations

The Model 22 and Model 24’s line input circuitry allows balanced and unbalanced signals with a nominal level of –15 to +10 dBu to be correctly interfaced. The system is designed to have an access station send interrupt signals at a signal level of –10 dBu to the Model 2A Central Controller. A level adjustment trim pot on the Model 22 and Model 24 allows the various signal levels to be adjusted to give the desired signal strength. Set the trim pot only after installing the Model 2A and associated Model 22 and Model 24 units. The calibration procedure is as follows:

1. Begin by connecting an audio level measuring device across the test points labeled COM and AUDIO on the Model 22 or Model 24’s circuit board. Set the meter to display the audio signal level in terms of dBu, i.e., level in dB referenced to 0.7746 volts RMS with no defined load impedance.
2. While speaking into the microphone, headset, or other device that produces the line-level signal, adjust the trim pot to give an average level of approximately –10 dBu as shown on the meter. Peak signals should fall in the –5 to 0 dBu range. This trim pot setting should result in a clean, clear interrupt signal, without excess compressing by the Model 2A’s circuitry.

Safety Warning

A competent technician is required to perform any configuration changes that entail accessing the Model 2A’s circuit board. The cover of the Model 2A must be removed, exposing the technician to a potential shock hazard. Only after AC mains power has been disconnected and the mains cord removed from the back of the Model 2A should the cover be removed. Four screws, two on each side of the chassis, are used to secure the cover.

Configuring Auto Answer

From the factory the auto answer function associated with telephone interface 2 (TELCO 2) will typically be configured to answer after detecting one cycle of ringing voltage. This setting may be appropriate for most applications. But some may benefit from an alternate configuration. Two switches, part of a 4-position DIP switch assembly, allow the auto answer function

to be configured from among four choices: answer after one, two, or four rings or disable auto answer. The DIP switch, located on the Model 2A's printed circuit board, is labeled SW2. It's located between the 3-pin female XLR connector for program input C and the rotary level control for IFB channel 1. Access requires removing the unit's cover. You must observe proper safety precautions as highlighted in the Safety Warning section of this guide. Refer to Figure 10 for details on how to configure the switches.

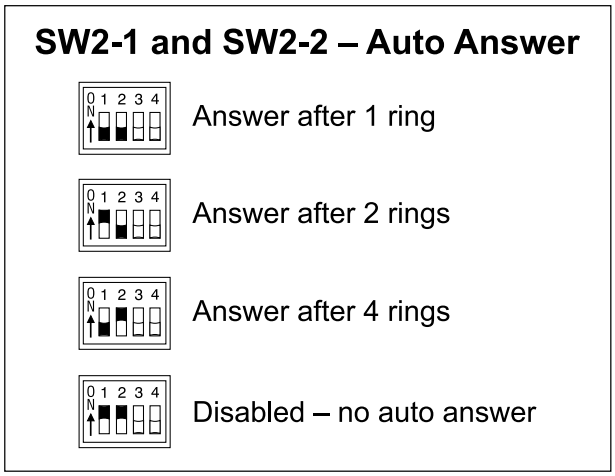


Figure 10. Telephone Interface 2 Auto Answer settings

Dim/Mute Function

From the factory, program audio is set to fully mute upon interrupt. If level "dimming" rather than full muting is desired, a modification can be performed by a qualified technician. This would entail installing two surface-mount fixed resistors in the Model 2A's circuit board. This process requires removing the Model 2A's cover. You must observe proper safety precautions as highlighted in the Safety Warning section of this guide. Contact the factory for details.

Technical Notes

Definition of Level

Studio Technologies has opted to use the dBu designation as it seems to be quite rational. Using dBm was fine when all audio line outputs were terminated with 600 ohm loads. In this way it was easy to say that 0 dBm is 1 milliwatt dissipated in the known load (i.e., 0 dBm across 600 ohms will measure 0.775 V). In current situations an output is rarely terminated in 600 ohms; generally 5 k ohms or higher. The dBu designation is better because it refers to dB referenced to 0.775 V, with no reference to load impedance. This takes into account the current audio scene where most equipment has a low output source impedance and a high input impedance.

Models 32A and 33A Minimum Output Level

By design, the output level on the Model 32A and Model 33A Talent Amplifiers cannot be set to fully "off." While the output level can be substantially attenuated, it never can be set for full attenuation. This implementation was selected to ensure that talent personnel could never accidentally be fully "isolated" from their program or IFB source. There may be special cases where full attenuation is desired. This might be especially true with the Model 33A Talent Amplifier, where a mix of the two IFB channels can be achieved. Provisions on the Model 32A and Model 33A circuit boards have been made to allow this to be modified. In the standard design a fixed resistor in series with one side of the level potentiometer prevents full attenuation. By replacing this resistor with a "0 ohm" resistor or jumper strap, full attenuation can be achieved. Contact the factory for details.

Specifications

Model 2A Central Controller

General Audio Parameters (Program Input to Main Output):

Overall Frequency Response: 20 Hz to 20 kHz, –0.3 dB @ 20 Hz, –0.8 dB @ 20 kHz

Distortion (THD+N): 0.008%

S/N Ratio: 89 dB, ref. +4 dBu nominal

Interrupt Audio Compressor/Limiters: one per IFB channel, studio quality, dual slope, threshold 1 dB above nominal

Connectors:

Access Station: DE-9F (9-pin D-subminiature, female)

Program and Aux Audio Inputs: 3-pin female XLR

Line Outputs: 3-pin male XLR

Talent Amplifier Output: 3-pin male XLR

Telephone Interfaces: 2, RJ11 modular jack (6-position modular with pins 3 and 4 implemented)

Monitor Amplifier Output: ¼-inch, 2-conductor phone jack

AC Mains Input: 3-blade, IEC 320 C14-compatible (mates with IEC 320 C13)

Internal Interrupt Microphone: electret condenser

Program Inputs: 4

Type: electronically balanced, direct coupled

Impedance: 24 k ohms

Level: +4 dBu, nominal, trim adjustable over a range of –10 to +8 dBu

Auxiliary Audio Input:

Type: electronically balanced, direct coupled

Impedance: 24 k ohms

Level: +4 dBu, nominal, trim adjustable over a range of –10 to +8 dBu

Application: used with voice operated (VOX) interrupt function

Line Outputs: 2, 1 per IFB channel

Type: electronically balanced, capacitor coupled, intended to drive 2000 ohm or greater loads

Level: +4 dBu, nominal, +25 dBu maximum

Talent Amplifier Output:

Applications: provides power and audio signals for up to six Model 32A or Model 33A Talent Amplifiers. Also allows connection of party-line (PL) intercom beltpacks.

Connections: common on pin 1, DC (+24 volts DC nominal) modulated with channel 1 audio (–10 dBu nominal) on pin 2, and channel 2 audio (–10 dBu nominal) on pin 3

Output Impedance: 200 ohms nominal from pin 2 to 1; 200 ohms nominal from pin 3 to pin 1; RTS® and Clear-Com® compatible

Maximum DC output current: 250 milliamperes

Maximum Audio Output Level: +10 dBu

Voice Operated (VOX) Interrupt Function:

Input Source: audio from telephone interface 1, audio from telephone interface 2; or auxiliary audio input, selectable

Output: IFB channel 1 or 2, selectable

Detection Bandpass: 400 to 1400 Hz, nominal

Detect Time: <1 mSec

Release Time: 320 mSec, nominal

Telephone Interfaces 1 and 2:

Operating Modes: switch selectable for use with telephone lines or standard balanced or unbalanced audio signals

Receive Audio Level: –15 dBu, nominal, trim adjustable ±8 dB

Telephone Line Requirements: 2-wire, loop start, 10 milliamperes loop current minimum

Telephone Line Disconnect: manual, using front-panel switch; automatic, after detection of 250 mSec, nominal, break in loop current

Telephone Line Interface Control: switch on front panel allows manual answer (“off-hook”) and manual hang-up (“on-hook”) functions

Telephone Interface 2—Additional Features:

Auto Answer (when set for telephone line operation): configurable for 1, 2 or 4 rings or disabled

Audio Routing Control: switch on front panel allows Interface 2 to receive audio, or send IFB channel 1 or 2 audio

Send Audio Level: –6 dBu, nominal

Monitor Output:

Power: 4 watts RMS into 8 ohms @ 1% THD+Noise

Application: designed to drive loads of 8 ohms or greater

Access Station Interface: allows connection of up to four Model 22 or Model 24 Access Stations

AC Mains Input: 100-240 volts (-15/+10%), 50/60 Hz, 24 watts maximum

Dimensions (Overall):
19.0 inches wide (48.3 cm)
1.72 inches high (4.4 cm)
9.2 inches deep (23.4 cm)

Mounting: one space (1U) in a standard 19-inch rack

Weight: 4.5 pounds (2.1 kg)

Model 22 Access Station

Application: provides remote 2-channel interrupt (talk) location based on a Model 2A Central Controller unit; up to four Model 22 units can be connected to a Model 2A Central Controller

Power Requirements: 18 volts DC, 25 milliamperes maximum, provided by connected Model 2A Central Controller

Interconnection:

Two DE-9F (9-pin D-subminiature female) connectors. One connector intended to link Model 22 to Model 2A Central Controller. The second connector, wired in parallel with the first, is designed to allow "loop through" installation for connection to additional Model 22(s).

Pushbutton Switches: 2

Type: backlit, momentary, EAO 99-series

Lamp Type: incandescent, T-1, bi-pin, 18 V, 26 milliamperes, 0.5 watt equivalent to EAO Switch Corp. 11-903-2, Wamco 0L1100BPE, Lamptronics AS25-8

Audio Inputs: electret microphone or line level, switch selectable

Microphone Input:

Compatibility: 2-wire electret, designed for use with Studio Technologies' Model 11A Gooseneck Microphone (purchased separately)

Intended Input Level: –25 dBu nominal

Microphone Power: +5 volts DC, current limited. Applied to microphone "high" lead.

Connector: three terminals on a screw terminal strip

Line Input:

Type: electronically balanced, capacitor coupled, compatible with balanced or unbalanced audio signals

Input Impedance: 24 k ohms

Common Mode Rejection: 100 dB at DC and 60 Hz, 70 dB at 20 kHz, 62 dB at 40 kHz (typical)

Input Level: –15 to +10 dBu, input level adjustable via trim potentiometer

Connector: two terminals on a screw terminal strip

Dimensions (Overall):
6.4 inches wide (16.3 cm)
1.6 inches high (4.1 cm)
5.2 inches deep (13.2 cm)

Mounting:

Rack mounted using Model 25A 19-Inch Rack Adapter (purchased separately). Panel mounted using Model 28A Panel Adapter (purchased separately). Custom mounting easily accomplished.

Weight: 0.8 pounds (0.4 kg)

Model 24 Access Station

Application: provides remote 4-channel interrupt (talk) location for IFB system based on two Model 2A Central Controller units, up to four Model 24 units can be connected to the two Model 2A Central Controllers

Power Requirements: 18 volts DC, 50 milliamperes nominal, provided by connected Model 2A Central Controller

Interconnections:

Two DE-9F (9-pin D-subminiature female) connectors. Each links the Model 24 with a Model 2A Central Controller

Interrupt Switches: 5

Functions: IFB 1-4, All Call

Type: momentary pushbutton, EAO 99-series, all backlit, tally indication for IFB 1-4 functions

Microphone Input:

Compatibility: 2-wire electret, designed for use with Studio Technologies' Model 11A Gooseneck Microphone (purchased separately)

Intended Input Level: –25 dBu nominal

Connector: three terminals on a screw terminal strip

Line Input:

Type: transformer coupled, compatible with balanced or unbalanced audio signals

Input Impedance: 40 k ohms, nominal

Input Level: –15 to +10 dBu, adjustable using trim potentiometer

Connector: two terminals on a screw terminal strip

Monitor Muting: switch selectable, allows Model 24 interrupt activity to mute monitor amplifier outputs on Model 2A Central Controllers

Dimensions (Overall):
6.4 inches wide (16.3 cm)
1.6 inches high (4.1 cm)
5.2 inches deep (13.2 cm)

Mounting:

Rack mounted using Model 27A 19-Inch Rack Adapter (purchased separately). Can also be flush mounted in custom-fabricated rectangular opening in enclosure or work surface.

Weight: 0.8 pounds (0.35 kg)

Model 25A 19-Inch Rack Adapter

Application: intended for use with Model 22 Access Station and Model 11A Gooseneck Microphone

Dimensions (with Model 22 attached):

19.0 inches wide (48.3 cm)
1.72 inches high (4.4 cm)
5.2 inches deep (13.2 cm)

Mounting: one space (1U) in a standard 19-inch rack

Weight (with Model 22 attached): 1.6 pounds (0.7 kg)

Model 27A 19-Inch Rack Adapter

Application: intended for use with one Model 24 Access Station and one Model 11A Gooseneck Microphone

Dimensions (with Model 24 attached):
19.0 inches wide (48.3 cm)
1.72 inches high (4.4 cm)
5.2 inches deep (13.2 cm)

Mounting: one space (1U) in a standard 19-inch rack

Weight (with Model 24 attached): 1.6 pounds (0.7 kg)

Model 28A Panel Adapter

Application: intended for use with one Model 22 Access Station and one Model 11A Gooseneck Microphone

Dimensions (with Model 22 attached):
8.0 inches wide (20.3 cm)
2.75 inches high (7.0 cm)
5.2 inches deep (13.2 cm)

Mounting:

Designed to be mounted in a panel opening. Recommended opening size 6.5 inches wide (16.5 cm), 1.7 inches high (4.3 cm), 6.5 inches minimum depth (16.5 cm)

Weight (with Model 22 attached): 1.3 pounds (0.6 kg)

Model 32A Talent Amplifier

Applications: directly compatible with talent amplifier output on Model 2A Central Controller; also compatible with standard single- and dual-channel IFB and party-line intercom circuits

Indicator Light: red LED indicates operation of internal power supply

Connectors:

Input: 3-pin female XLR

Loop Through: 3-pin male XLR

Output: ¼-inch and 3.5 mm 2-conductor jacks; sleeve common, tip "hot," ring not used

IFB/Intercom Input Wiring Scheme:

Pin 1: common for DC and audio

Pin 2: DC with channel 1 audio (dual-channel circuits) or DC only (single-channel circuits)

Pin 3: channel 1 audio (single-channel circuits) or channel 2 audio (dual-channel circuits)

Power Requirement: 18-35 volts DC, 15 milliameres quiescent, 40 milliamperes maximum

Output:

Compatibility: intended for connection to mono (2-conductor) headsets or earpieces with nominal impedance of 150 ohms or greater

Type: voltage driver

Input/Output Gain: 28 dB, maximum

Maximum Output Voltage: 8 volts peak-to-peak, 1 kHz, 150 ohm load

Frequency Response: 40 Hz-20 kHz, ±1 dB, 150 ohm load

Distortion (THD+N): 0.03%, 1 kHz, 150 ohm load, 0 dBu out

Dimensions (Overall):
3.25 inches wide (8.3 cm)
1.8 inches high (4.6 cm)
3.95 inches deep (10.0 cm)

Mounting:

Intended for portable applications. Contains integral belt clip. Optional mounting adapter kit *(Order Code: TAB-01)* allows Model 32A to be permanently mounted.

Weight: 0.6 pounds (0.3 kg)

Model 33A Talent Amplifier

Applications: directly compatible with talent amplifier output on Model 2A Central Controller; also compatible with standard single- and dual-channel IFB and party-line intercom circuits

Indicator Light: red LED indicates operation of internal power supply

Connectors:

Input: 3-pin female XLR

Loop Through: 3-pin male XLR

Output: ¼-inch and 3.5 mm 2-conductor jacks; sleeve common, tip “hot,” ring not used

IFB/Intercom Input Wiring Scheme:

Pin 1: common for DC and audio

Pin 2: DC with channel 1 audio (dual-channel circuits) or DC only (single-channel circuits)

Pin 3: channel 1 audio (single-channel circuits) or channel 2 audio (dual-channel circuits)

Power Requirement: 18-35 volts DC, 15 milliameres quiescent, 40 milliamperes maximum

Output:

Compatibility: intended for connection to mono (2-conductor) headsets or earpieces with nominal impedance of 150 ohms or greater

Type: voltage driver

Input/Output Gain: 28 dB, maximum

Maximum Output Voltage: 8 volts peak-to-peak, 1 kHz, 150 ohm load

Frequency Response: 40 Hz-20 kHz, ±1 dB, 150 ohm load

Distortion (THD+N): 0.03%, 1 kHz, 150 ohm load, 0 dBu out

Dimensions (Overall):
3.25 inches wide (8.3 cm)
1.8 inches high (4.6 cm)
3.95 inches deep (10.0 cm)

Mounting:

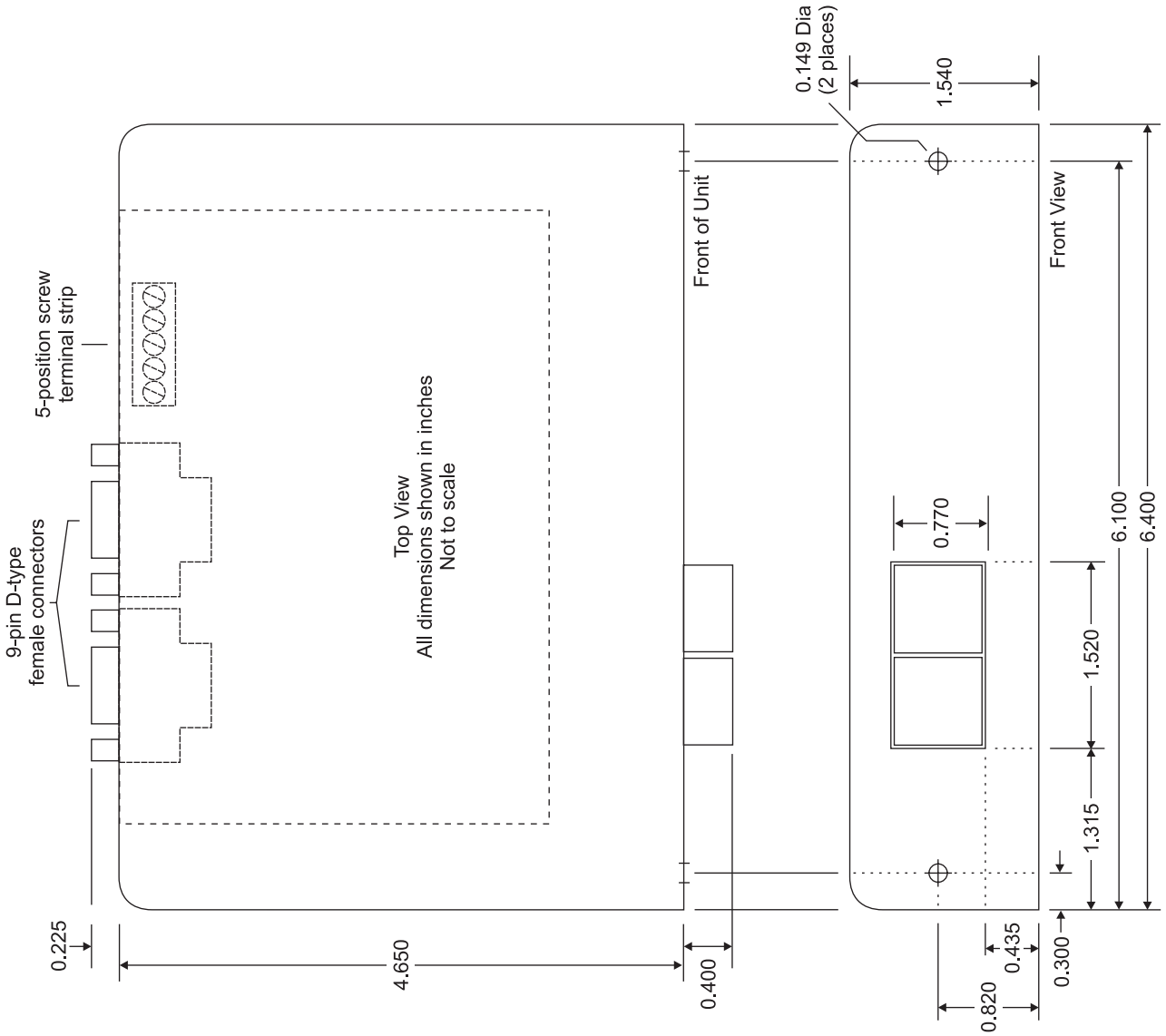
Intended for portable applications. Contains integral belt clip. Optional mounting adapter kit *(Order Code: TAB-01)* allows Model 33A to be permanently mounted.

Weight: 0.6 pounds (0.3 kg)

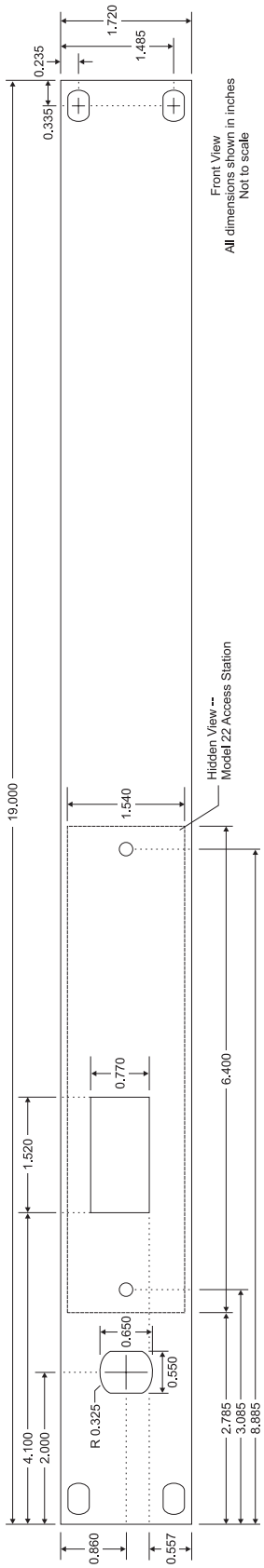
Specifications and information contained in this User Guide subject to change without notice

Appendix A–IFB Plus Series Mechanical Drawings

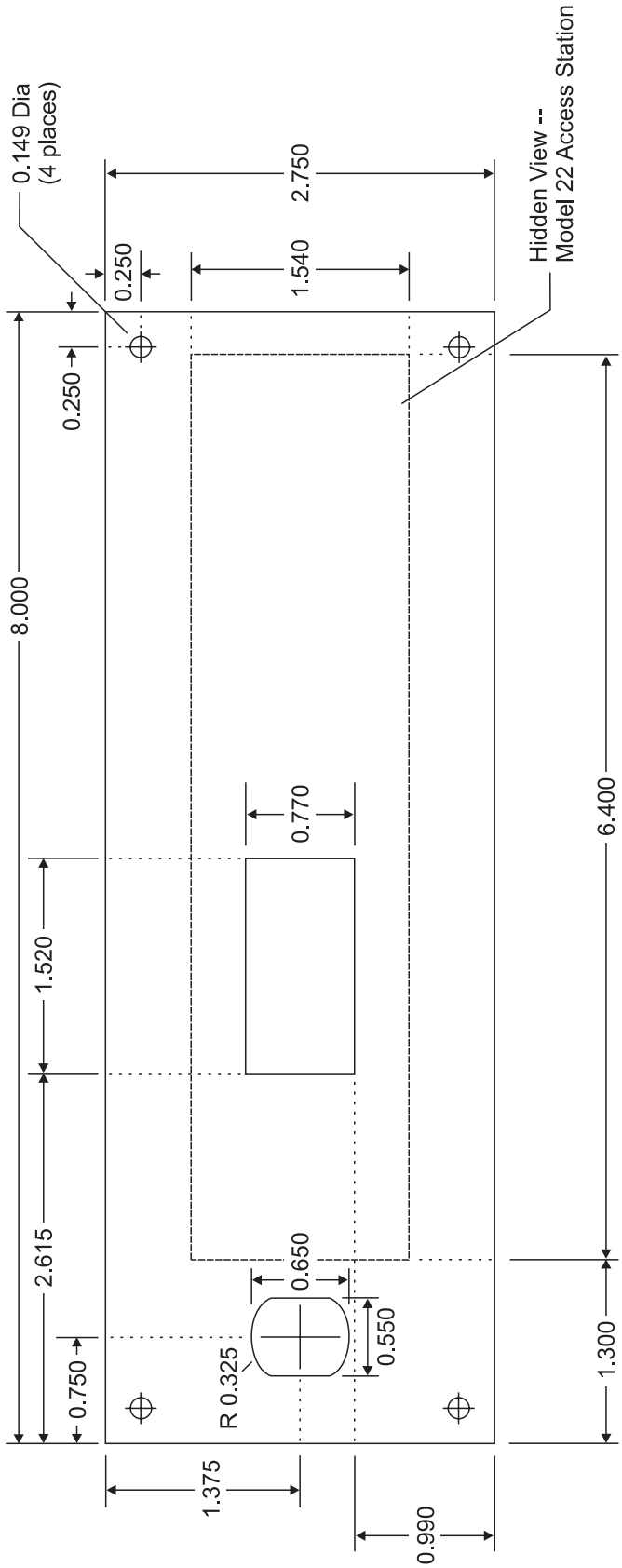
Model 22 Access Station Overall Dimensions



Model 25A 19-Inch Rack Adapter (used with Model 22 Access Station and Model 11A Gooseneck Microphone)

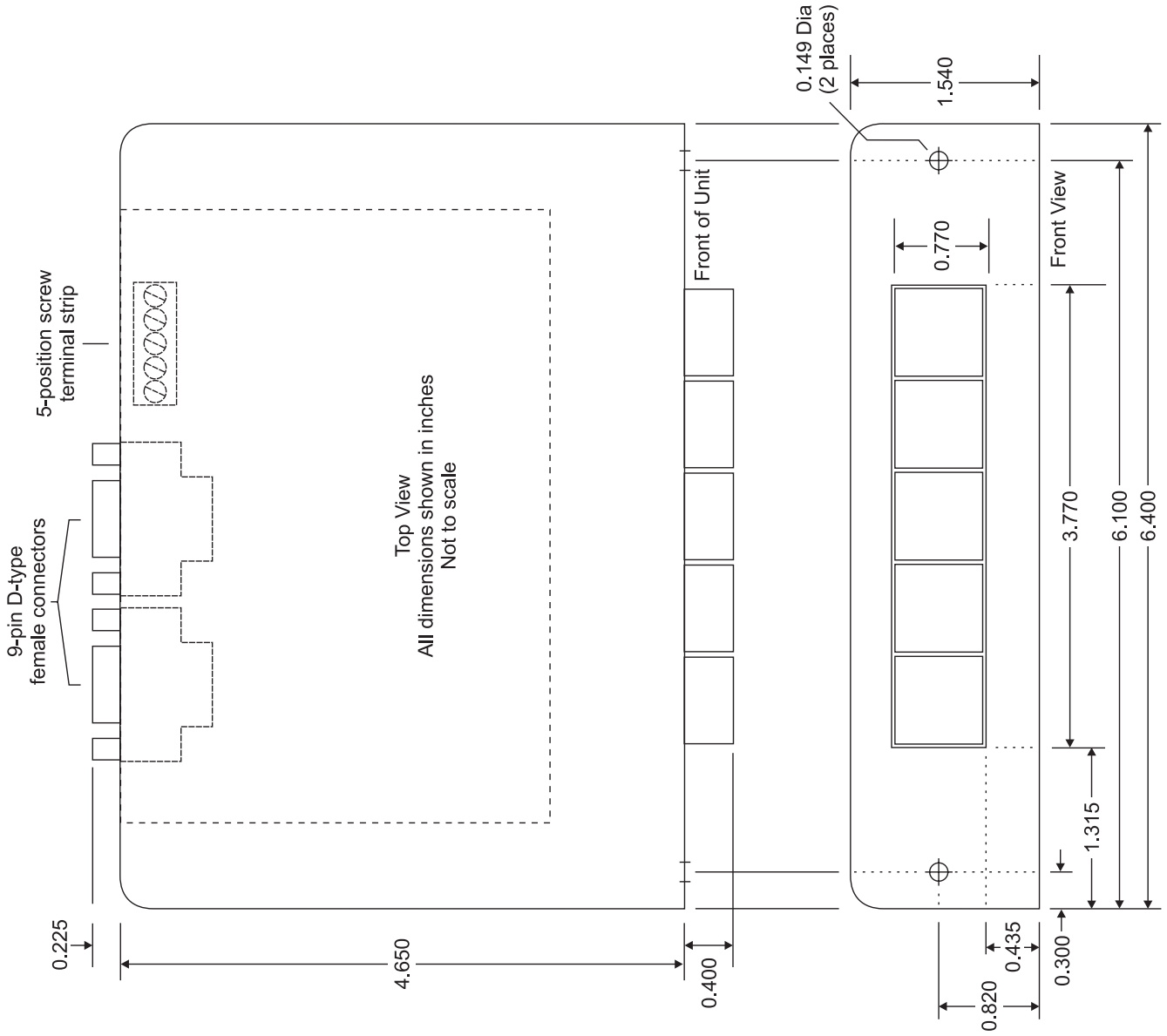


Model 28A Panel Adapter
(used with Model 22 Access Station and Model 11A Gooseneck Microphone)

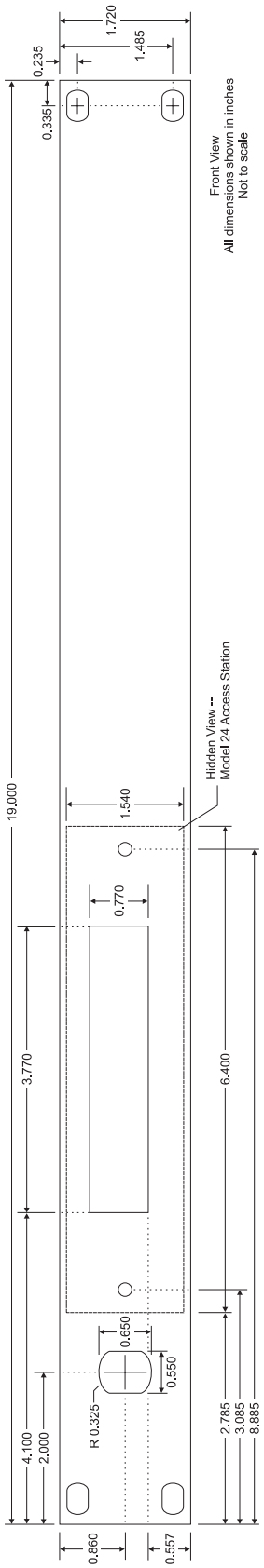


Front View
All dimensions shown in inches
Not to scale

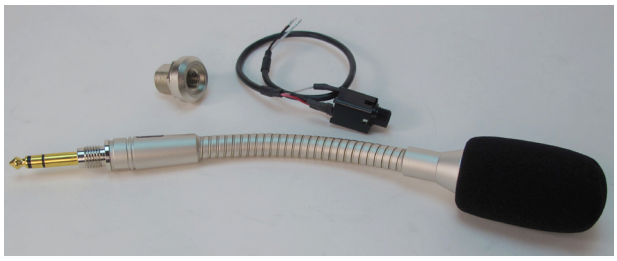
Model 24 Access Station Overall Dimensions



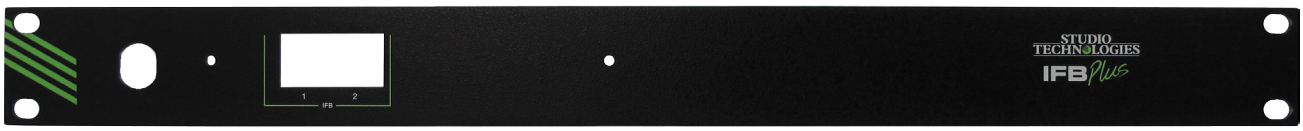
Model 27A 19-Inch Rack Adapter
(used with Model 24 Access Station and Model 11A Gooseneck Microphone)



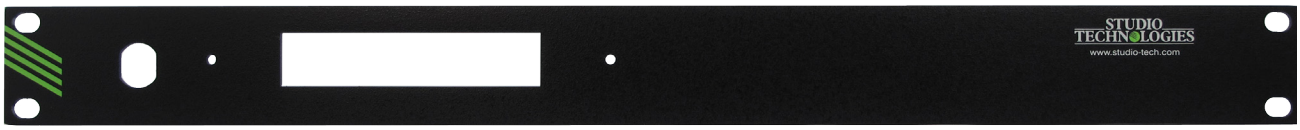
Appendix B–IFB Plus Series Optional Accessories



Model 11A Gooseneck Microphone *(Order Code: M11A)*
(For use with Model 22 and Model 24 Access Stations,
Model 25A and Model 27A 19-Inch Rack Adapters, and Model 28A Panel Adapter)



Model 25A 19-Inch Rack Adapter *(Order Code: M25A)*
(For use with Model 22 Access Station)



Model 27A 19-Inch Rack Adapter *(Order Code: M27A)*
(For use with Model 24 Access Station)