

SCM810/SCM810E EIGHT-CHANNEL MICROPHONE MIXER



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IMPORTANT SAFETY INSTRUCTIONS

1. READ these instructions.
2. KEEP these instructions.
3. HEED all warnings.
4. FOLLOW all instructions.
5. DO NOT use this apparatus near water.
6. CLEAN ONLY with dry cloth.
7. DO NOT block any ventilation openings. Allow sufficient distances for adequate ventilation and install in accordance with the manufacturer's instructions.
8. DO NOT install near any heat sources such as open flames, radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Do not place any open flame sources on the product.
9. DO NOT defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. PROTECT the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. ONLY USE attachments/accessories specified by the manufacturer.
12. USE only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. UNPLUG this apparatus during lightning storms or when unused for long periods of time.



14. REFER all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. DO NOT expose the apparatus to dripping and splashing. DO NOT put objects filled with liquids, such as vases, on the apparatus.
16. The MAINS plug or an appliance coupler shall remain readily operable.
17. The airborne noise of the Apparatus does not exceed 70dB (A).
18. Apparatus with CLASS I construction shall be connected to a MAINS socket outlet with a protective earthing connection.
19. To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
20. Do not attempt to modify this product. Doing so could result in personal injury and/or product failure.
21. Operate this product within its specified operating temperature range.



This symbol indicates that dangerous voltage constituting a risk of electric shock is present within this unit.



This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

WARNING: Voltages in this equipment are hazardous to life. No user-serviceable parts inside. Refer all servicing to qualified service personnel. The safety certifications do not apply when the operating voltage is changed from the factory setting.

DESCRIPTION

The Shure Model SCM810/E is an eight-channel automatic microphone mixer designed for use in sound reinforcement, audio recording, and broadcast applications. The SCM810 dramatically improves audio quality in any application where multiple microphones are required. Any low-impedance dynamic or condenser microphone (including wireless) can be used with the SCM810/E. Multiple SCM810 mixers can be linked to other SCM810/E mixers, as well as to Shure Models FP410, SCM410 and SCM800 mixers.

Each input channel has a two-band equalizer and three logic terminals. The equalizer reduces unwanted low-frequency audio pickup and makes different microphone types-lavaliers, boundary and handheld-sound similar. The logic terminals can be used to control external devices.

The SCM810 operates on 120 Vac power; the SCM810E operates on 230 Vac power. Each mixer is supplied with a power cord, rack-mounting hardware, and a link cable.

SYSTEM FEATURES

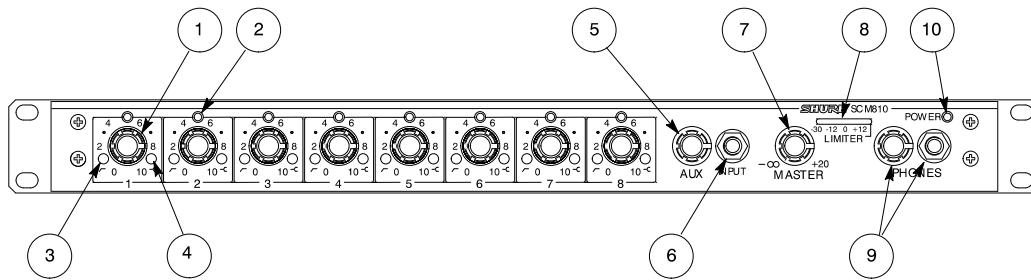
- Fast-acting, noise-free microphone selection that automatically adjusts to changes in background room noise
- Automatic gain adjustment as additional microphones are activated
- Last Mic Lock-On circuit that maintains ambient sound
- Adjustable low-frequency rolloff and high-frequency shelving for each channel
- Channel activation and clipping indicators
- Peak-responding output limiter with selectable thresholds and LED indicator
- Active balanced mic/line inputs and line/level output
- Aux-level input with manual level control
- Front-panel headphones output with level control
- Linking capability for up to 400 microphones

OPERATING PRINCIPLES

The operating concept behind the SCM810/E Automatic Mixer is Shure's proprietary *IntelliMix*[®] circuitry. *IntelliMix* delivers seamless automatic mixing by combining three separate functions:

- **Noise Adaptive Threshold.** Distinguishes between constant background noise (such as air conditioning) and changing sound (such as speech) for each input channel. It continuously adjusts the activation threshold so that only speech levels louder than the background noise activate a channel.
- **MaxBus.** Controls the number of channels that may be activated for a single sound source. One talker activates only one channel, even if multiple microphones "hear" that talker.
- **Last Mic Lock-On.** Keeps the most recently activated microphone open until another microphone is activated. Without Last Mic Lock-On, a long pause in conversation would cause all microphones to turn off, which would sound as if the audio signal had been lost. Last Mic Lock-On ensures that background ambience is always present.

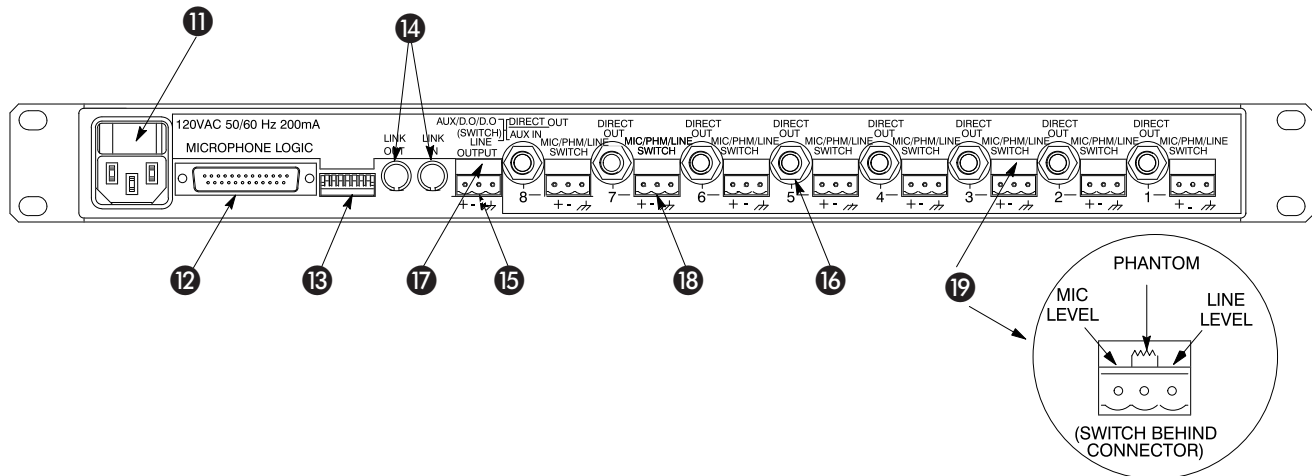
FRONT PANEL FEATURES



MODEL SCM810 FRONT PANEL
FIGURE 1

- ❶ **Microphone Channel Gain Controls 1 - 8:** Allows adjustment of microphone gain.
- ❷ **Input LED 1 - 8:** Lights green when channel is active; lights red at 6 dB below clipping level.
- ❸ **Low-Cut Filter 1 - 8:** Recessed screwdriver adjustment provides adjustable low-frequency rolloff (high pass) to reduce undesirable low-frequency signals.
- ❹ **High-Frequency Shelving Filter 1 - 8:** Provides level boost or cut in mid/high-frequency region to compensate for off-axis tone coloration, or for cutting high-frequency sibilance.
- ❺ **AUX Level Control:** Sets the input level for aux-level equipment connected to the adjacent 1/4-inch INPUT phone jack or rear-panel 1/4-inch AUX input.
- ❻ **Aux INPUT 1/4-inch Phone Jack:** Mixes external auxiliary- or line-level sources into output. This out is *not* automatic. Signal appears at output of all linked mixers.
- ❼ **MASTER Level Control:** Determines the overall mix level.
- ❽ **Output Level Meter:** Nine-segment LED meter indicates peak output signal level. Last LED indicates limiter action.
- ❾ **PHONES Control and 1/4-inch Phone Jack:** Permits monitoring of mixer output through headphones. The PHONES knob controls headphones output level.
- ❿ **POWER LED:** Lights green when unit is powered.

REAR PANEL FEATURES



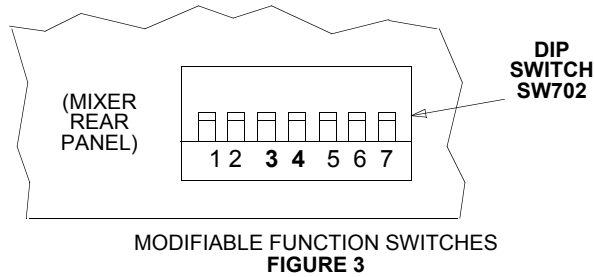
SCM810 REAR PANEL
FIGURE 2

- ❶ **AC Power Connector and Rocker Switch:** Connector supplies AC power to unit when plugged into a power source: the rocker switch turns the unit on.
- ❷ **Microphone Logic:** DB-25 male connector interfaces with each channel's GATE OUT, MUTE IN, and OVERRIDE IN logic terminals. See the *Suggested Logic Applications* section. NOTE: THIS IS NOT AN RS-232 PORT.
- ❸ **DIP Switch:** The 7-position DIP switch provides setup options for the mixer (see *DIP Switches* section).
- ❹ **LINK IN/OUT Jacks:** Allow multiple mixers to be stacked for additional inputs. Up to 50 SCM810 mixers can be linked.
- ❺ **LINE OUTPUT Removable Block Connector:** Active balanced line-level signal for connection to amplifiers, recorders or other mixers. Output can be modified to microphone level (see *Internal Modifications*).
- ❻ **DIRECT OUT 1/4-inch Phone Jacks:** Provides non-gated aux-level signal from each channel. Direct outs are wired pre-fader and pre-EQ. Can be modified for use as a gated channel output, send/receive insert point, or external speech gate for mixing consoles (see *Internal Modifications* section).
- ❼ **AUX/D.O./D.O. Switch:** Located behind the Line Output connector, this switch selects either aux input function or direct output function for channel 8 Direct Out jack. Left switch position is AUX IN; center and right positions are DIRECT OUT.
- ❽ **INPUT 1-8 Removable Block Connectors:** Active balanced microphone- or line-level inputs.
- ❾ **Input 1 - 8 MIC/PHM/LINE Switch:** Located behind the removable block connector, this switch selects operation at either microphone-level (left), microphone-level with 48 V phantom power (center), or line-level (right) signals.

DIP SWITCHES

The rear-panel DIP switch provides the following setup options. The positions shown in bold type are the factory settings.

NOTE: Switch positions and effects are shown in Figure 3 and also on the mixer label.



DIP SWITCH SW702 FUNCTIONS

Switch Function	Manual/Auto	Last Mic Lock-On	Hold Time	Off-Attenuation Level	Limiter Threshold	Link Local/Global
Switch Position Number→	1	2	3	4	5,6	7
Switch Up	Auto	On	0.4 second	15 dB	5 Up 6 Up = Limiter off 5 Down = +8 dBm 6 Up 5 Up = +16 dBm 6 Down 5 Down = +4 dBm 6 Down	Global
Switch Down	Manual	All mics off after hold time	1.0 second	∞ (completely off)		Local

Manual/Auto: Automatic activation is defeated in the Manual position. In Manual mode, functions as a standard 8x1 mixer.

Last Mic Lock-On: Last Mic Lock-On feature keeps the most recently activated microphone turned on until a newly activated microphone takes its place. When defeated, microphones turn off after their preset hold time.

Hold Time: Adjusts the time an activated microphone (which is not locked on) remains on after the talker stops talking. Settings are 0.4 seconds or 1.0 second.

Off-Attenuation: Changes the off-attenuation level from 15 dB to infinity (∞). With the 15 dB setting, an unused microphone is 15 dB lower in level than when it is activated. With the ∞ setting, an unused microphone is completely off.

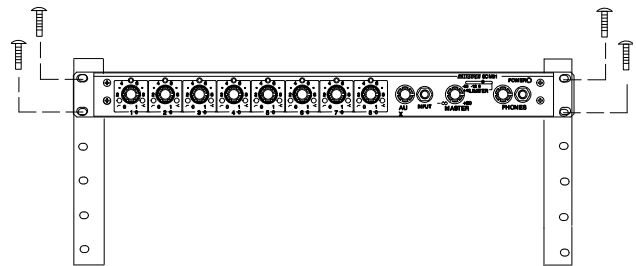
Limiter Threshold: Changes the output limiter threshold. Settings are OFF (factory setting), +16 dBm, +8 dBm, or +4 dBm (see *Internal Modifications* for other threshold settings).

Link Global/Local: Determines whether each linked SCM810 output contains only its own program output, or that of all linked mixers (see *Mixer Linking* for more information).

INSTALLATION AND SYSTEM SETUP

RACK MOUNTING THE MIXER

To mount the SCM810 in a standard 483 mm (19-inch) audio equipment rack, slide the mixer into the rack and secure it with the supplied Phillips head screws, as shown in Figure 4. Use all four screws.

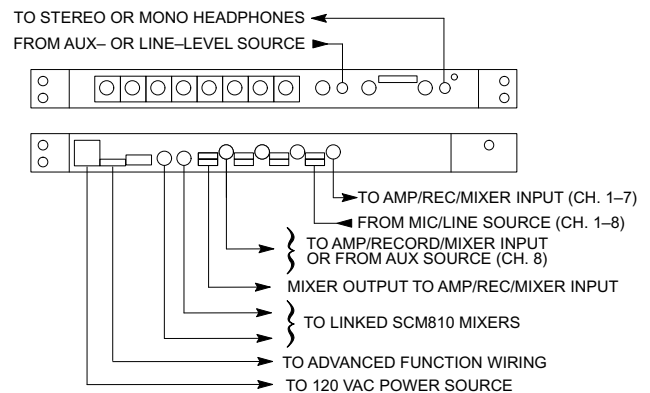


RACK MOUNTING THE SCM810/E
FIGURE 4

SCM810/E CONNECTIONS

Make audio connections as follows (see Figure 5).

1. Connect microphone- or line-level signal sources to the Channel Input connectors (use conventional 2-conductor shielded cables).
2. Insert a screwdriver or other tool in the slot above each block connector and adjust the input slide switch as required: microphone (left position), microphone with 48 V phantom power (center position), or line level (right switch position).
3. Connect the SCM810 Line Level Output to the input of mixers, EQs, amplifiers or recorders.
4. For headphones monitoring, connect headphones to the front-panel 1/4-inch PHONES jack.
5. Connect the power cord to 120 Vac (SCM810) or 230 Vac (SCM810E). If the operating voltage is to be changed, refer to the *Internal Modifications* section.



AUDIO CONNECTIONS
FIGURE 5

OUTPUT LIMITER SETTINGS

The output limiter prevents distortion during loud program peaks without affecting normal program levels. This prevents overloading of the devices connected to the SCM810/E output.

Increasing the individual channel or Master Gain controls will increase the average output and, in turn, the amount of limiting. **As supplied, the output limiter is defeated.** However, you can change the limiter threshold so that the peak output level is +4, +8, or +16 dBm. Refer to the *Internal Modifications* section.

EQUALIZER FUNCTIONS

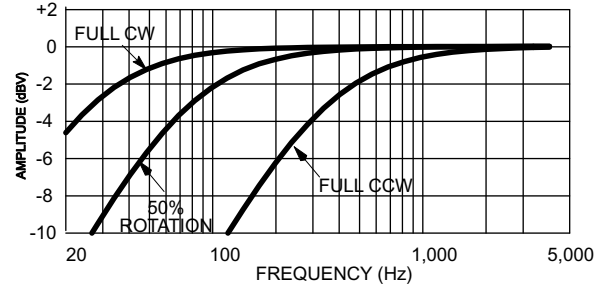
Low Cut Filter (High-Pass)

The low-cut (or high-pass) filter allows all frequencies above its cutoff point to pass from filter input to filter output without attenuation, while frequencies below the cutoff are attenuated (see Figure 6). The cutoff point is defined as the frequency where the signal has dropped 3 dB relative to the flat, or bandpass, region. Below the cutoff point, the filter exhibits increasingly more attenuation as the frequency diminishes. The rate at which this attenuation occurs is defined in decibels per octave (dB/oct). The SCM810 has a one-pole, low-cut (high-pass) filter of 6 dB per octave.

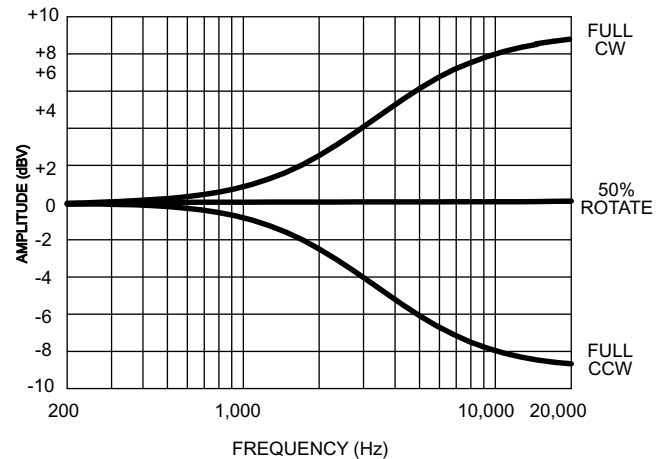
Low-cut filters are ideally used for attenuating, or rolling off, the audio signal where extraneous noise, excessive proximity effect, or other unwanted material is present. For example, the low-frequency vibration caused by footsteps and vehicle traffic can be transmitted through microphone stands to the microphone, and then into the sound system. These frequencies, typically ranging from 5 to 80 Hz, are generally not desirable.

High-Frequency Shelving

The fixed-frequency equalizer produces a 6 dB boost or cut at 5 kHz and above (see Figure 7). High-frequency shelving is extremely useful for boosting flat frequency response, tempering very sibilant vocal microphones, or enhancing the sound of off-axis lavalier microphones.



LOW-CUT FILTER EFFECTS
FIGURE 6



HIGH-FREQUENCY SHELIVING EFFECTS
FIGURE 7

USING AN EQUALIZER/FEEDBACK CONTROLLER WITH AN AUTOMATIC MIXER

When setting up a sound system which has an outboard equalizer or feedback controller in the signal chain, set the SCM810 to MANUAL. This activates all microphone inputs, so every possible feedback path is open. With the SCM810 in MANUAL mode, equalize the sound system and/or "Ring Out" the room to set the feedback controller.

After equalizing the sound system, set the SCM810 to AUTOMATIC mode. Remember that the input of an automatic mixer drops by 3 dB every time the number activated inputs doubles. When using an SCM810 in MANUAL mode, the master output drops by 9 dB when all 8 inputs are activated. Conversely, it will rise by 9 dB when switched back to AUTOMATIC mode.

BASIC MIXER OPERATION

1. Turn on the Power switch.
2. Adjust each channel level so that its Overload LED flickers only during very loud speech or noise.
3. Turn unused channel controls full counterclockwise.
4. Adjust the SCM810 Master level control for the required output level, as indicated by the output peak meter.

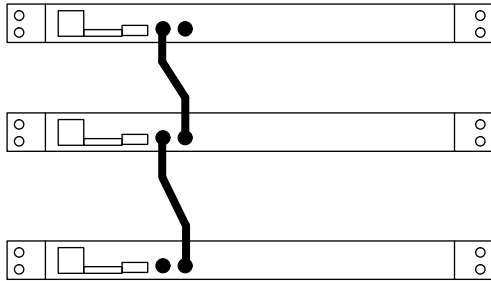
5. If a headphone monitor is to be used, adjust the PHONES control knob until the desired volume level is reached. The SCM810/E is now ready to use.

NOTE: The SCM810/E mixer is fully automatic. For most applications, no additional adjustments are required.

NETWORKING MULTIPLE MIXERS

If additional inputs are needed, more SCM810 mixers (as many as 50) can be "linked" using supplied link cables. Such a configuration can provide up to 400 microphone inputs.

To link multiple mixers, connect the LINK OUT of the first mixer to the LINK IN of the next mixer, and so on (see Figure 8). Leave the LINK IN jack of the *first* mixer and the LINK OUT jack of the *last* mixer unconnected.



LINKING MIXERS
FIGURE 8

As long as the link jacks of all mixers are connected (out-to-in, sequentially, leaving one Link In and one Link Out jack unconnected), the automatic mixing functions will be shared by all units. All input signals appear at all linked mixer outputs. There is no master/slave relationship.

The output controls and functions of each linked mixer are post-link and do not affect the signals appearing at other linked mixer outputs. Each mixer's Master level control only controls its own output. Each output can be used independently.

NOTE: The actual off-attenuation in the 15 dB switch position increases as more mixers are linked. This reduces excessive noise and reverberation contributed by the increased number of attenuated microphones.

In a linked system, the Aux input of any mixer appears at each linked mixer's output. See *Internal Modifications* to defeat the linking of Aux signals.

IMPORTANT: When using the logic terminals on linked mixers, connect the LOGIC GROUND terminals of each unit together. Switching clicks may result if this is not done.

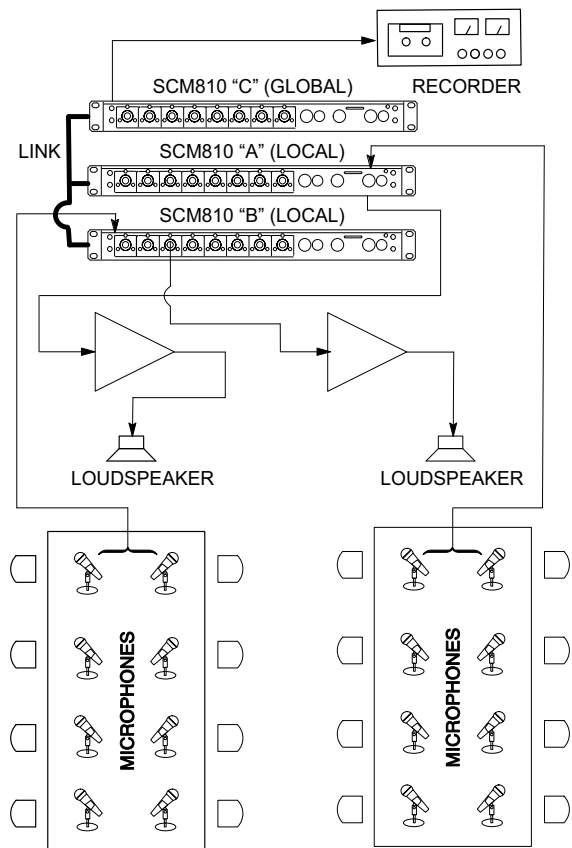
GLOBAL/LOCAL FUNCTIONS

The Global/Local switch selects which input channels appear at that linked mixer's output. Set to the Global position, *all* input channels appear at that mixer's output. Set to the Local position, only its own eight input channels appear at that mixer's output. The Master level control, in any mode, only controls the level of its own output.

The Master level control is independent of the Global/Local switch. The output level of each mixer is affected *only* by its own Master control. All automatic functions (such as Last Mic Lock-on and MaxBus) are connected on all linked mixers and are not affected by the Global/Local switch.

An example of the possibilities of this setup is shown in Figure 9. Here two SCM810s are set to Local, and the resulting sound distribution provides local sound reinforcement while avoiding feedback. This is a simple "mix-minus" setup. The third SCM810 is set to Global and feeds a tape recorder. At the same time, the automatic functions (Last Mic Lock-On, etc.) remain common to all mixers. The following table summarizes the mixer settings.

MIXER	Link Global/Local Switch	Audio Output Contains...
A	Local	A
B	Local	B
C	Global	A, B, C



LINKED SCM810 MIXERS
FIGURE 9

LINK CABLES

Additional link cables are available as Shure Part No. 95A1143 (305 mm-12 in.). Longer cables in a variety of lengths are available from Apple Computer as computer printer connections; they are variously referred to by Apple as "shielded serial cable with two mini DIN-8 connectors," and "Apple System Peripheral-8 Cable."

SPECIFICATIONS

Measurement Conditions (unless otherwise specified): Line voltage 120 Vac, 60 Hz (SCM810) or 230 Vac, 50 Hz (SCM810E); full gain; 1 kHz, one channel activated; source impedances: Mic 150 Ω, Line 150 Ω; terminations: Line 10 kΩ, Phones 300 Ω (tip-sleeve and ring-sleeve), Direct Out 10 kΩ; Auto mode, equalization controls adjusted for flat response

Frequency Response (Ref 1 kHz, channel controls centered)

50 Hz to 20 kHz ±2 dB; -3 dB corner at 25 Hz

Voltage Gain (typical, controls full clockwise)

Input	Output		
	Line	Headphones	Direct Out
Low-impedance mic (150 Ω)	80 dB	88 dB	34 dB
Line	40 dB	48 dB	-6 dB
Aux	44 dB	52 dB	-
Send/Return	20 dB	28 dB	-

Inputs

Input	Impedance		Input Clipping Level
	Designed for use with	Actual (typical)	
Mic	19-600 Ω	1.6 kΩ	-15 dBV
Line	≤2 kΩ	10 kΩ	+22 dBV
Aux	≤2 kΩ	10 kΩ	+22 dBV
Send/Return	≤2 kΩ	10 kΩ	+18 dBV

Outputs

Output	Impedance		Output Clipping Level
	Designed for use with	Actual (typical)	
Line	>600 Ω	60 Ω	+18 dBV
Headphones	8-200 Ω, 60 Ω recommended	300 Ω	+12 dBV
Direct Out	>2 kΩ	1 kΩ	+18 dBV
Send/Return	>2 kΩ	1 kΩ	+18 dBV

Total Harmonic Distortion

<0.1% at +18 dBV output level, 50 Hz to 20 kHz (through 20 Hz-20 kHz filter; Input 1 and Master at 5, all other controls full counterclockwise)

Hum and Noise

Equivalent Input Noise -125 dBV (150 Ω source; through 400 Hz -20 kHz filter)

Equivalent Input Hum and Noise: -123 dBV (150 Ω source; through 20 Hz - 20 kHz filter)

Output Hum and Noise (through 20 Hz to 20 kHz filter; channel controls full counterclockwise))

Master full counterclockwise -90 dBV
Master full clockwise -70 dBV

Common Mode Rejection

>70 dB at 1 kHz

Polarity

Mic/Line, Send inputs to all outputs are non-inverting; Aux input to all outputs is inverting

Input Channel Activation

Attack Time 4 ms
Hold Time 0.4 s (Switchable to 1.0 s)
Decay Time 0.5 s

Off-Attenuation

15 dB (switchable to ∞)

Overload and Shorting Protection

Shorting outputs, even for prolonged periods, causes no damage. Microphone inputs are not damaged by signals up to 3 V; Line and Monitor inputs by signals up to 20 V

Equalization

Low-frequency 6 dB/octave cut, adjustable corner from 25 to 320 Hz
High-frequency ±6 dB at 5 kHz, ±8 dB at 10 kHz, shelving

Limiter

Type Peak
Threshold Switchable: off, +4, +8, +16 (dBm at output)
Attack Time 2 ms
Recovery Time 300 ms
Indicator Lights red when limiting occurs

Input LEDs

Green on channel activation, red at 6 dB below clipping

Phantom Power

46 Vdc open-circuit through 6.8 kΩ series resistance per DIN 45 596

Operating Voltage

SCM810: 120 Vac rated nominal, 50/60 Hz, 200 mA
SCM810E: 230 Vac rated nominal, 50/60 Hz, 100 mA

Temperature Range

Operating: 0° to 60° C (32° to 140° F)
Storage: -30° to 70° C (-20° to 165° F)

Overall Dimensions

44.5 mm H x 483 mm W x 317 mm D
(1 3/4 x 19 x 12 1/2 inches)

Net Weight

4.3 kg (9 lb 9 oz)

Certifications

SCM810: Listed by Underwriters Laboratories, Inc.; cUL Certified (Canada). SCM810E: Conforms to European Union Directives; Certified to EN60065; Eligible to bear CE Marking; Conforms to European EMC Directive 2004/108/EC; Meets Harmonized Standards EN55103-1:1996 and EN55103-2:1996 for residential (E1) and light industrial (E2) environments.

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Replacement Parts

Block Connector 95A8580
Knob, Master & Phones (white) 95A8238
Knob, Channel Gain (blue) 95B8238
Line (Power) Cord (SCM810) 95B8389*
Line (Power) Cord (SCM810E) 95C8247*
Link Cable 95B8889

Service Statement

For additional service or parts information, please contact the Shure Service Department at 1-800-516-2525. Outside the United States, please contact your authorized Shure Service Center.

*For systems requiring other mains connectors, obtain a power cord with an IEC 320 type mating connector for connection to the SCM810, and an appropriate plug on the other end for connection to the mains. The supplied cord uses Harmonized IEC Cordage with color coding as follows: Brown = Line, Blue = Neutral, Green/Yellow = Ground.

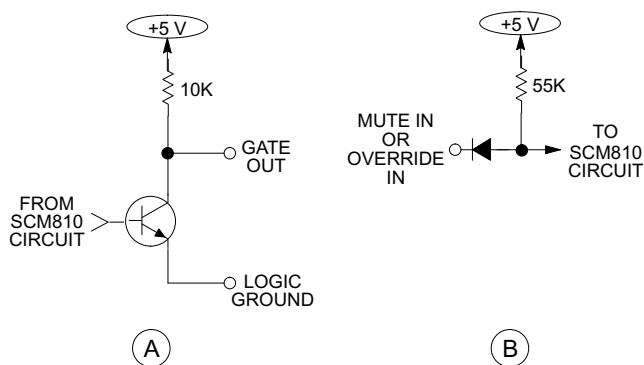
ADVANCED FUNCTIONS

The SCM810's Advanced Functions are recommended only for those who are technically knowledgeable and familiar with audio electronics.

LOGIC CONNECTION SPECIFICATIONS

The logic functions of the SCM810 expand the mixer's range of installation and control options. Logic can be used for everything from simple cough switches to elaborate computer-controlled room systems. (Shure's *AMS Update* publication contains additional applications of advanced logic. This publication is available by contacting Shure's Applications Group.) The following logic functions are available for each channel:

GATE OUT: Follows channel gating and goes to logic "low" (sinks current) when microphone is gated on. 500 mA of current sinking ability is provided (see Figure 10A).



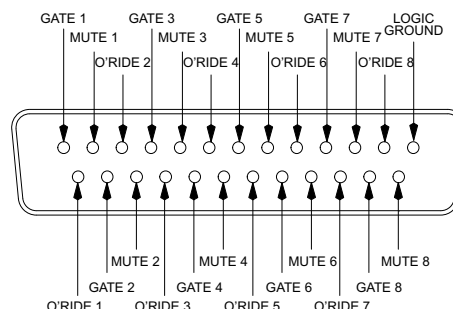
LOGIC EQUIVALENT CIRCUIT DIAGRAMS
FIGURE 10

MUTE IN: Applying logic "low" (from GATE OUT or a switch closure to logic ground) gates channel off (see Figure 10B). Channel output drops to $-\infty$.

OVERRIDE IN: Applying logic "low" (from GATE OUT or a switch closure to logic ground) forces channel on (see Figure 10B). Factory setting provides that when both Mute and Override are activated, Mute takes precedence (see *Internal Modifications* for Override precedence).

LOGIC GROUND: Logic ground is distinct from the SCM810 audio ground. Make all logic ground connections to this pin, including power supply ground of external logic circuitry. To avoid switching clicks, *do not* connect logic ground to audio, chassis or rack grounds.

Logic controls are accessed at the DB-25 multi-pin connector on the rear panel (Figure 11). The pin connections are given in the following table.



LOGIC CONNECTOR
FIGURE 11

LOGIC CONNECTIONS

Logic Function	Input Channel	Connector Pin No.
GATE OUT 1	1	1
GATE OUT 2	2	15
GATE OUT 3	3	4
GATE OUT 4	4	18
GATE OUT 5	5	7
GATE OUT 6	6	21
GATE OUT 7	7	10
GATE OUT 8	8	24
OVERRIDE IN 1	1	14
OVERRIDE IN 2	2	3
OVERRIDE IN 3	3	17
OVERRIDE IN 4	4	6
OVERRIDE IN 5	5	20
OVERRIDE IN 6	6	9
OVERRIDE IN 7	7	23
OVERRIDE IN 8	8	12
MUTE IN 1	1	2
MUTE IN 2	2	16
MUTE IN 3	3	5
MUTE IN 4	4	19
MUTE IN 5	5	8
MUTE IN 6	6	22
MUTE IN 7	7	11
MUTE IN 8	8	25
Logic Ground	all	13

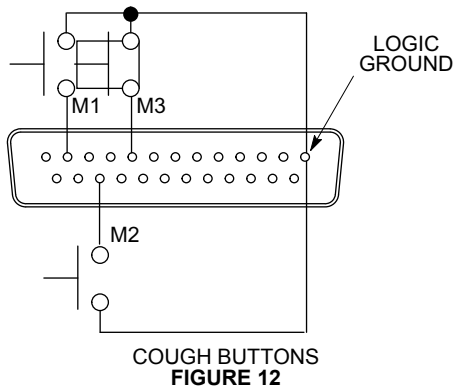
SUGGESTED LOGIC APPLICATIONS

This section contains suggestions on the uses of the SCM810's logic capabilities. Note that uses of these functions are not limited to the listed applications. The user is limited only by individual imagination and creativity. For additional suggestions and solutions to installation problems, contact Shure's Applications Group.

In the following paragraphs, the wiring diagrams refer to the DB-25 connector pins shown in Figure 4.

Cough Button

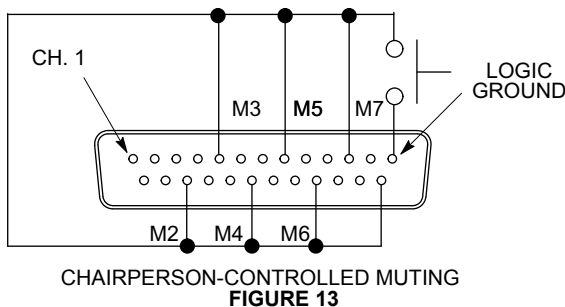
The talker can turn off his or her microphone during coughing or private conversations by installing an SPST pushbutton switch between the MUTE IN and Logic Ground pins for each channel to be modified (see Figure 12-Channels 1, 2 and 3 modified). When a channel is muted, no audio is passed. (See "Dead Zone on MUTE IN Defeat" in *Internal Modifications* section for more information on MUTE IN logic.)



Chairperson-Controlled Muting

The chairperson can, by activating a switch, silence all other microphones and be heard without interruption. For operation in this mode, connect all the MUTE IN pins together *except that of the chairperson's channel*, and wire an SPST pushbutton or toggle switch between those MUTE IN and Logic Ground pins (see Figure 13-the chairperson is shown as Channel 1).

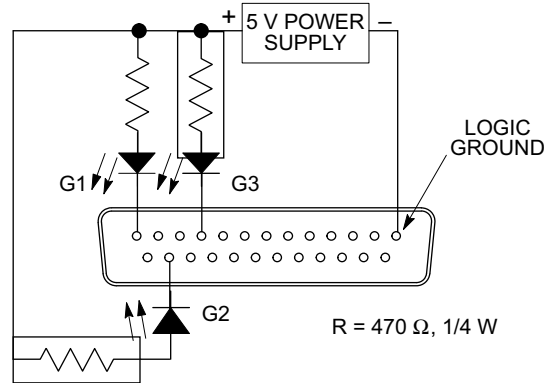
An alternative to a switch is to connect the chairperson's GATE OUT to the MUTE IN of other channels. When the chairperson's microphone activates, all other microphones mute.



Remote Channel-On Indicators

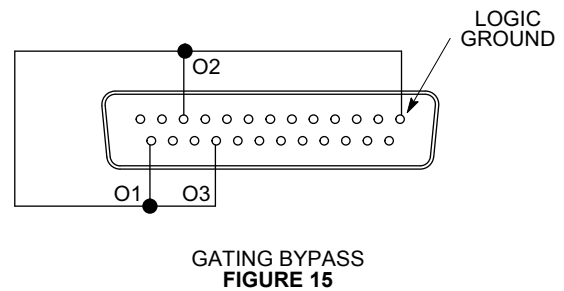
Remote indicators can be used to indicate when a talker's microphone is on. Connect the LEDs and a 5-volt supply to the GATE OUT pins as shown in Figure 14 (Channels 1, 2 and 3 shown modified). To avoid switching clicks in the audio output, *do not* ground the power supply negative terminal in the audio system or rack ground.

IMPORTANT: If a single cable is used for the microphone audio signal *and* the LED dc power, separate shielded pairs **must** be used. Failure to carry the dc power on a shielded pair may result in audible clicking due to capacitive coupling between the dc power lines and microphone lines.



Disabling the Gating Function (Bypass)

To keep certain microphones on at all times, wire the desired microphone channel's OVERRIDE IN pins together to the Logic Ground pin. The selected channels now function as they would in a non-automatic mixer (see Figure 15-Channels 1, 2 and 3 modified).



Inhibiting Gating for Unwanted Sounds

As described in the *Operating Principles* section, MaxBus attempts to activate only one microphone per sound source. Muting a microphone channel prevents its audio from appearing at the mixer's output. However, the muted microphone still communicates with other mic channels via MaxBus. A sound source picked up by a muted microphone will not activate other microphones.

Sound sources that may cause unwanted microphone channel activation include:

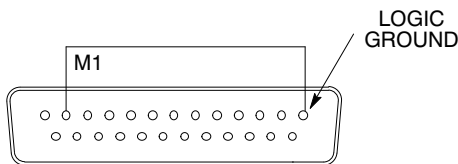
- A noisy fax machine or printer
- A squeaky door
- A paging system loudspeaker
- An audio teleconferencing return signal loudspeaker

The SCM810 can prevent these and similar sounds from activating microphones by taking the following steps.

1. Place one microphone near the unwanted sound source. Connect that microphone's signal to a channel input,

-OR-

 connect the unwanted sound source directly into a Mic/Line channel input.
2. Mute that channel using the logic terminal (see Figure 16-Channel 1 is muted).
3. Adjust that channel's gain control just to the level where other microphones in the system do not activate for the unwanted sound. If the channel gain is set too high, other system microphones will be difficult to activate for *desired* sounds. If set too low, unwanted sounds will continue to activate other microphones.



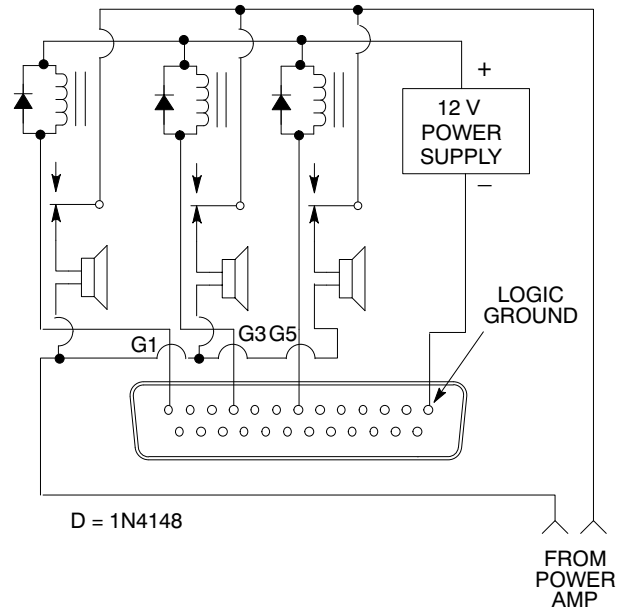
INHIBITING GATING UNWANTED SOUNDS
FIGURE 16

Loudspeaker Muting

Some applications require a loudspeaker to be placed near each talker to provide audio reinforcement, or to permit telephone conversation or conference monitoring. Each loudspeaker can cause feedback unless it is automatically switched off when the talker near it speaks. To provide this function, connect the GATE OUT terminal of each channel to a separate loudspeaker muting relay as shown in Figure 17 (Channels 1, 3 and 5 shown modified). Recommended relays are Omron G6B-1174P-US-DC12, Potter & Brumfield R10-E1Y2-V185, or equivalent (available through Digi-Key and Newark Electronics).

NOTE: A diode across each relay coil is required to suppress inductive voltage spikes which may damage the SCM810.

An existing sound system using 24-volt relays can be used with the SCM810 without modification if the relay coil current draw is under 500 mA.



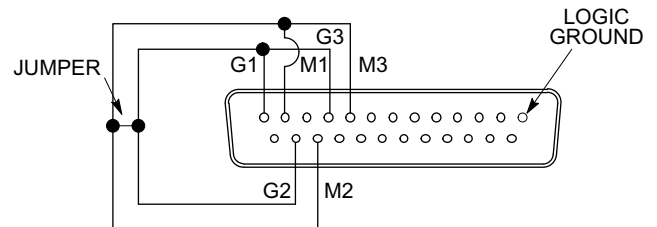
LOUDSPEAKER MUTING
FIGURE 17

“Filibuster” Mode

In normal operation, when several people talk, each microphone gates on so that no speech is missed. In “filibuster” action, a microphone that is gated on prevents other microphones from gating on. Once a microphone has gated on, other microphones cannot gate on until the talker has paused long enough for that microphone to gate off. Thus the person talking has the floor and cannot be interrupted.

To establish this function, first perform the internal Mute to “Inhibit” modification (see *Internal Modifications*). Then connect all the MUTE IN pins of the modified channels together, all the GATE OUT pins of the modified channels together, and the GATE OUT pin of one modified channel to the MUTE IN pin of another modified channel (see Figure 18-Channels 1, 2 and 3 modified). Turn the Last Mic Lock-On switch (SW702, position 2) to off.

NOTE: To prevent high-frequency oscillation, do not wire a channel's GATE OUT pin to its own MUTE IN pin unless the Mute to “Inhibit” change has been made.



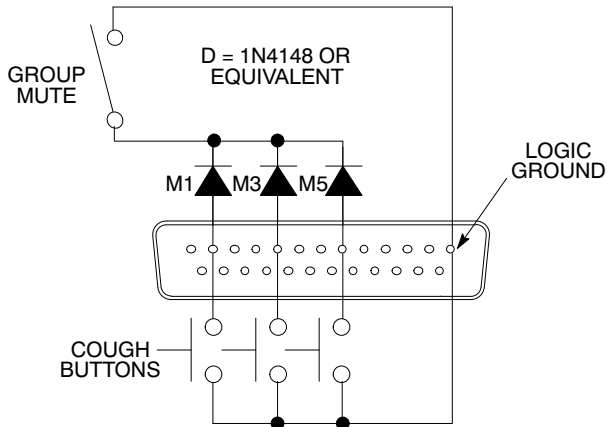
“FILIBUSTER” MODE
FIGURE 18

Inhibit Function

See *Internal Modifications*.

Diode Isolation of Logic Controls

Two or more control functions using the same logic pins can be isolated with diodes. In this manner a channel can be muted by an overall group mute switch, or by its own cough button (see Figure 19-Channels 1, 3 and 5 modified).

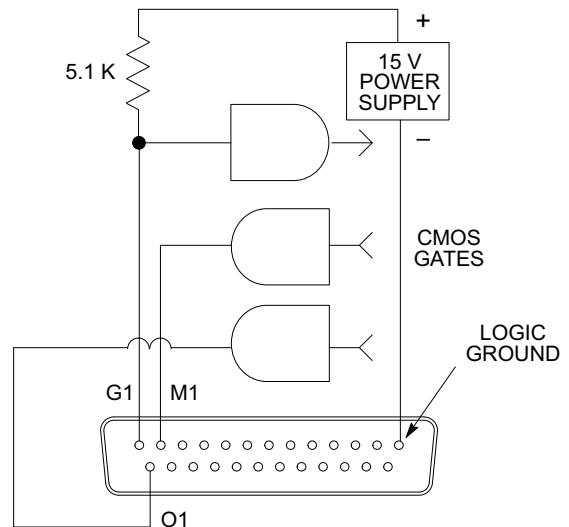


DIODE ISOLATION OF LOGIC CONTROLS
FIGURE 19

External Logic Devices

SCM810 logic levels are directly compatible with TTL and 5-volt CMOS logic families. For information on logic gate use, refer to the *TTL Cookbook* and *CMOS Cookbook*, both by D. Lancaster, Howard Sams Publishing Co.

Mixer logic may be used with 15-volt CMOS logic if a pull-up resistor is used with each GATE output (see Figure 20-Channel 1 modified).



15-VOLT CMOS
FIGURE 20

Digital Controls or Microcomputers

The SCM810 logic pins can interface with custom-designed digital control circuitry or microcomputers for unlimited possibilities of system control functions.

INTERNAL MODIFICATIONS

WARNING: All modifications must be performed by qualified service technicians.

NOTE: Remove AC power before opening the unit.

This section describes SCM810 modifications that can be made using solder "jumpers" on the printed circuit board; the pads where jumpers may be used are placed close together so that a single solder drop functions as a jumper. Note too that:

1. The only printed circuit board legends used for these modifications are jumpers (X's) and resistors (R's).

2. Where resistors are to be added, through-holes are present on the board.
3. For individual channel modifications, the first number of the reference designation refers to its channel number, i.e., R1027 refers to a Channel 1 resistor, X7216 refers to a Channel 7 jumper, etc. All references to Channels 1 through 8 in the following paragraphs use Channel 1 jumpers and resistors as reference. Modifications affecting the Master section are preceded by the number "9" (X901, etc.).

To gain access to the main printed circuit board, remove the 8 Phillips head screws securing the top cover, and remove the top cover. Most modifications can be made from the top of the main board.

Line-Level Output to Mic-Level Output

Procedure:

Short jumper X901. Remove resistors R900 and R909.

Disable Master Level Control

The Master gain control can be disabled so it cannot be tampered with. The table indicates the resistor value to be used for the desired gain.

Master Section Gain	Resistance
-6 dB	5.1 k Ω
0	10 k Ω
6 dB	20 k Ω

Procedure:

Remove resistor R9230. Install new resistor at jumper X914.

Change Limiter Threshold

All three threshold settings (+16, +8 and +4 dBm) can be changed. To shift the threshold down by 6 dB, resistor R will be 82 k Ω . To shift the limiter thresholds up by 6 dB, R will be 330 k Ω .

Procedure:

Remove resistors R9177 and R9180. Install new resistor R at jumper X907.

Local Aux Operation

With linked mixers, the Aux input from a modified mixer does not link.

Procedure:

Remove resistor R9024.

Direct Out to Post-Fader

A channel's Direct Out phone jacks can be changed from pre- to post-fader.

Procedure:

Short jumper X106. Remove resistor R1011.

Direct Out to Post-Fader Send/Return (Insert)

Changes a channel's 1/4-inch Direct Out jack to a post-fader insert point. Send is tip of phone jack; return is ring. Insert jacks are useful for inserting line-level signal processors into a channel. For instance, a parametric EQ or compressor/limiter can be inserted into a channel for additional processing.

Procedure:

Short jumpers X101, X102, X105 and X106. Remove resistors R1011 and R1020.

Direct Out to Gated Direct Out

This post-fader, post-EQ channel output is gated, but without NOMA. In this mode, if the Local/Global switch is in "Local", a manual mix of channel inputs is present at the Line output. The Off-Attenuation level of the Gated Direct Out signal is infinite.

Procedure:

Short jumpers X104 and X906 (in Master section). Remove resistor R1011.

SCM810 Speech Gate for Mixing Console

The SCM810 can be used in conjunction with large mixing consoles to provide automatic mixing for talk shows, panel discussions, and news shows. Large consoles have channel insert jacks so that external signal processing devices can be patched into individual channel signal paths. With this modification the SCM810 can be placed into unbalanced insert jacks, and the SCM810 used as a high-quality, external, 8-channel speech gate. This arrangement allows the operator complete control of each channel via the console's input control strip, while the SCM810 keeps the number of open microphones to a minimum.

In this operational mode:

1. The Direct Out jack tip is the input from the mixing console, and the ring is the output to the mixing console.
2. The SCM810 channel inputs, faders and EQ do not function.
3. NOMA does not function, channel Off-Attenuation is infinite.
4. The front-panel channel overload indicators indicate gating and overload for each input.
5. The "Local" operating mode provides a non-automatic audio signal at the output for use in external mixes.
6. If the insert point on the mixing console is pre-fader, the gain trims should be set such that all microphone levels are similar.

Procedure:

Short jumpers X103, X107, X108 and X906 (in the Master section). Remove resistors R1011, R1019, and R1020.

MUTE IN Precedence to OVERRIDE IN Precedence

With this modification and when both MUTE IN and OVERRIDE IN logic are grounded for a channel, the Override mode will take precedence (as supplied, the MUTE IN takes precedence over OVERRIDE IN).

Procedure:

Short jumper X114. Remove resistor R1046.

Dead Zone on MUTE IN Defeat

As supplied, MUTE IN is intended for use as a momentary cough button or privacy function (mute when necessary). However, if the MUTE IN is intended to be used so that the talker must unmute microphones to enable speech pickup (unmute when needed), this modification is needed. This removes the muted channel from the MaxBus which eliminates "dead zones." A dead zone is an area in which a microphone picks up a talker through a muted microphone and other microphones do not activate for that talker.

Procedure:

Short jumper X115.

Change MUTE IN to Inhibit

As supplied, a channel will mute when its MUTE IN terminal is grounded. The mute function can be changed to "Inhibit" by an internal modification for each channel. After the modification, a logic "Low" at the MUTE IN terminal prevents that channel from gating on if it is off, but allows it to remain on if it is already on.

Procedure:

Short jumper X111.

IMPORTANT: To prevent high-frequency oscillation, never connect a channel's GATE OUT to its own MUTE IN unless the "Inhibit" modification has been made.

Change OVERRIDE IN to MUTE IN for Use with Filibuster Mode

This modification should only be performed with the *Change MUTE IN to Inhibit* modification described above.

Procedure:

Short jumper X113. Remove resistors R1046 and R1058.

Change Off-Attenuation Level

This modification changes the off-attenuation level from -15 dB to a selected value. Select from the following resistor values.

Off-Attenuation Level	Resistor Value
10 dB	18 k Ω
20 dB	50 k Ω
30 dB	150 k Ω

Procedure:

Remove resistors R9088 and R9145. Install new resistor at jumper points X904 and X908.

Increase Hold Time

In addition to the dip switch SW702 options of 0.4- and 1.0-second hold time, the hold time can be increased to 1.5 seconds. (More than 1.5 seconds is not recommended.)

Procedure:

Install a 470 k Ω resistor across jumper points X902. Move DIP switch down to 1.0-second position.

Decrease Hold Time

The hold time can be decreased from the factory preset of 0.4 seconds to 0.3 seconds. (Less than 0.3 seconds is not recommended.)

Procedure:

Install a 2 M Ω resistor at jumpers X903.

Remote Control of Link Global/Local, Off-Attenuation, Last Mic Lock-on, and Automatic/Manual DIP Switches

If desired, these functions can each be remotely controlled with an SPST switch.

Procedure:

1. Solder a wire in the pc board jumper hole adjacent to the desired function (printed on the printed circuit board). These jumpers are located just behind DIP switch SW902.
2. Solder a wire in the pc board jumper hole marked "GND" near switch SW902.
3. Set the desired DIP switch(es) to the Up position.
4. Run the jumper wires to the desired remote location and solder them to an SPST toggle switch. The wires can exit the SCM810 chassis above the DIP switches. Shorting any wire to the Ground wire will set the function(s) to the corresponding switch "down" position.

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