StudioComm

Model 58 Central Controller and
Model 591 Control Console

User Guide

Issue 1, September 1999

This User Guide is applicable for serial numbers:
Model 58 M58-00351 and later
Model 591 M591-00151 and later

StudioComm

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Foreword

Simply stated: I had a blast working on these StudioComm components! It is very rewarding to develop a set of products for a market that's actually receptive to new ideas and supportive of innovation.

Mitch Budniak designed much of the hardware and kept us out of "digital trouble." Carrie Loving provided engineering support and designed the product graphics. Larry Leviton wrote the excellent software that makes the hardware "come to life." Fred Roeck performed the mechanical design. Al "PCB PRO" Lux designed the...you guessed it! Joe Urbanczyk coordinated the safety testing and created the automated test routes for our Audio Precision System Ones.

Our plans are to continue with other StudioComm components. Your praise, comments, or complaints are encouraged, helping to keep us going in the right direction. Please contact me via E-mail at gkapes@studio-tech.com.

Sincerely,

Gordon K. Kapes
President

Introduction

What This User Guide Covers

This User Guide is designed to assist you when installing and using the Model 58 Central Controller and the Model 591 Control Console.

StudioComm

This StudioComm system starts with a Model 591 Control Console, a compact but comfortable "command center," that is designed to reside at the operator's location. Using a single 9-pin cable, a Model 591 connects to a Model 58 Central Controller, which is mounted in a single rack space.

The Models 58 and 591 were developed in conjunction with experts in the broadcast audio field. The overall goal turned out to be very straightforward: Provide the necessary technical performance and features, while keeping it simple to operate! Be certain that users won't have to go through a long "learning curve" before they become efficient. Allow the StudioComm system to be flexible, but not so much as to hinder the "big picture." The end result achieves these goals, providing extensive capability in a simple-to-operate format.

Model 58 Central Controller

The Model 58 Central Controller is a single rack-space unit that supports two output channels. It provides eight main inputs, of which four are supported by the Model 591 Control Console. Two 2-channel insert sections allow connection to external processing equipment. The 2-channel monitor output section is switched, using electromechanical relays,

to allow connection to two separate loudspeaker systems. Protection circuitry provides power-up and power-down protection for the loudspeakers. A 2-channel meter output provides a "reference" signal, and is not affected by the monitor output's level-control circuitry.

The main inputs, insert sends and returns, and monitor outputs are electronically balanced, while the meter outputs are unbalanced. Fifteen-turn trim potentiometers are used to precisely calibrate the main input, insert return, and monitor output signals. Audio signal connections are made using three 25-pin D-subminiature connectors. The connectors follow an industry-standard multi-channel wiring scheme. A 9-pin D-subminiature connector is used to connect the Model 58 to the Model 591 Control Console.

The bypass function allows a line-level audio source to be passively routed to the monitor output channels. The bypass function, along with remote control input 2, makes it simple for an existing facility to add monitoring capability, while maintaining its existing resources.

An 8-bit micro-controller provides the logic "horsepower" for the Model 58. DIP switches are used to select the Model 58's unit ID and operating mode. AC mains power is connected directly to the Model 58, which is factory selected for 100, 120, 220/240V operation. The internal power supply utilizes a toroidal mains transformer for quiet audio operation.

Model 591 Control Console

The Model 591 Control Console is a compact, self-contained unit designed to be located at the operator's position. It allows fingertip control of all monitoring

parameters. Numerous LEDs provide complete status information. The Model 591 supports four input sources and two output channels.

The Model 591 provides eight buttons for selection of the input routing. Two buttons are associated with each of the four main inputs, allowing the signals to be routed to the left and right monitor outputs as desired. No input has priority over any other. It is perfectly legitimate to have no input selected for monitoring, or to have all inputs routed to both the left and right monitor outputs. This flexibility is provided to allow users to monitor how their application dictates. Note that when inputs are combined and sent to a monitor output channel, there is no independent level control of the individual sources. They are simply combined (summed).

The input source preset functions allow up to four pre-configured input routing configurations to be selected at the "touch of a button." This allows monitoring configurations that are often selected to be stored for ready access.

The monitor output level is controlled either through the use of a large, easy-to-use rotary control, or by enabling the preset reference level. For operator convenience, the dim function allows the monitor output level to be reduced by a fixed dB amount. The mute all function disables the monitor outputs by activating the mute relays on the Model 58 Central Controller. A push-button switch and two LEDs are used to select the desired monitor output—either A or B.
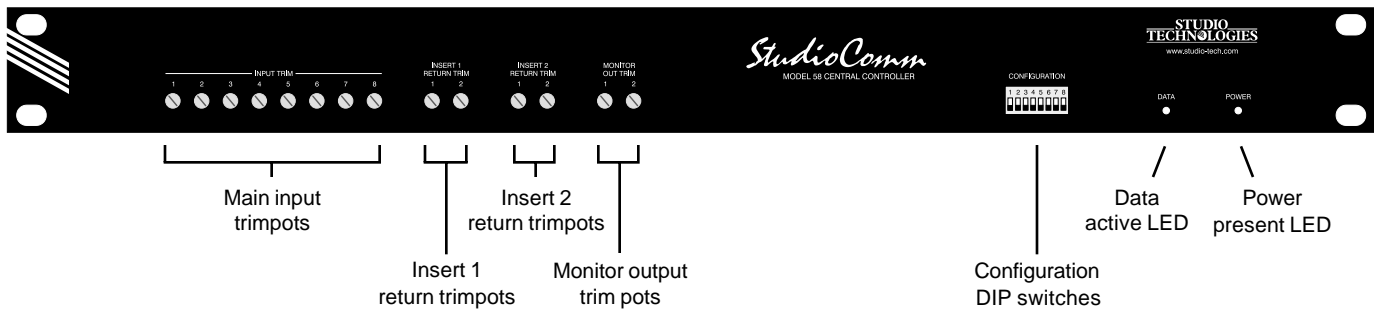
Figure 1. Model 58 Central Controller Front Panel

Main input trimpots

Insert 2 return trimpots

Insert 1 return trimpots

Monitor output trim pots

Configuration DIP switches

Data active LED

Power present LED

Figure 2. Model 58 Central Controller Back Panel

AC mains connection

To/from Model 591 Control Console

Remote contact and level control inputs

Monitor output, meter output, and bypass input connections

Insert send and return connections

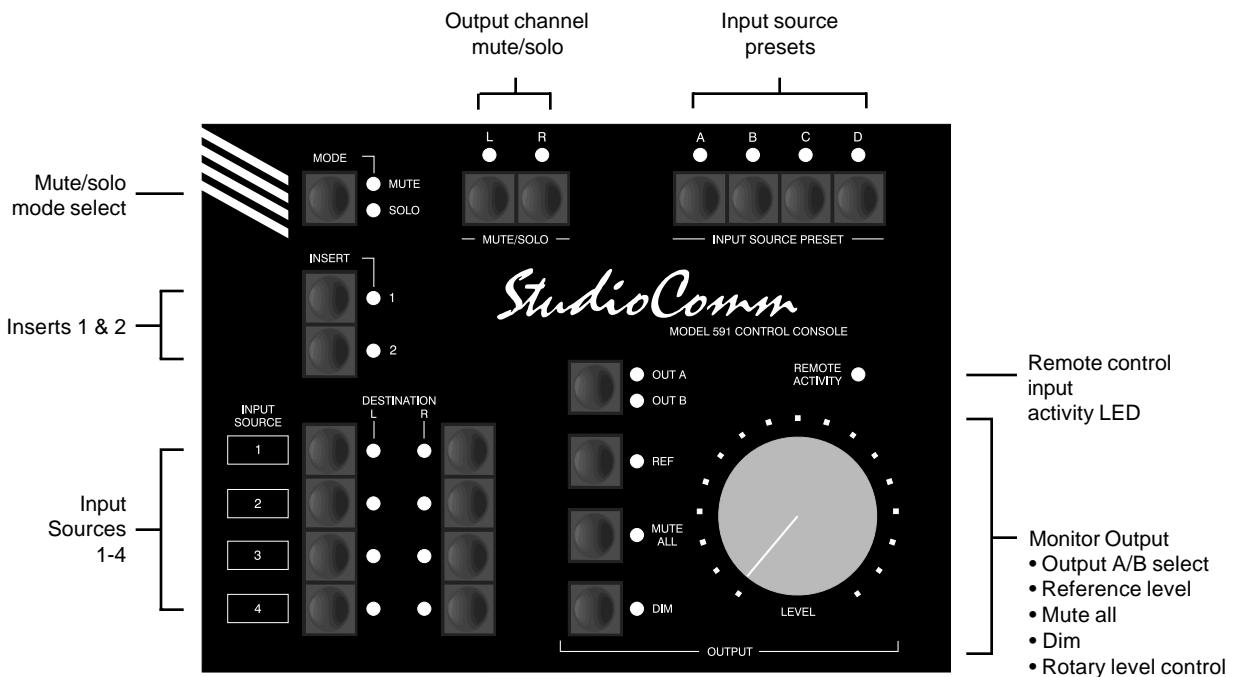Main input connections
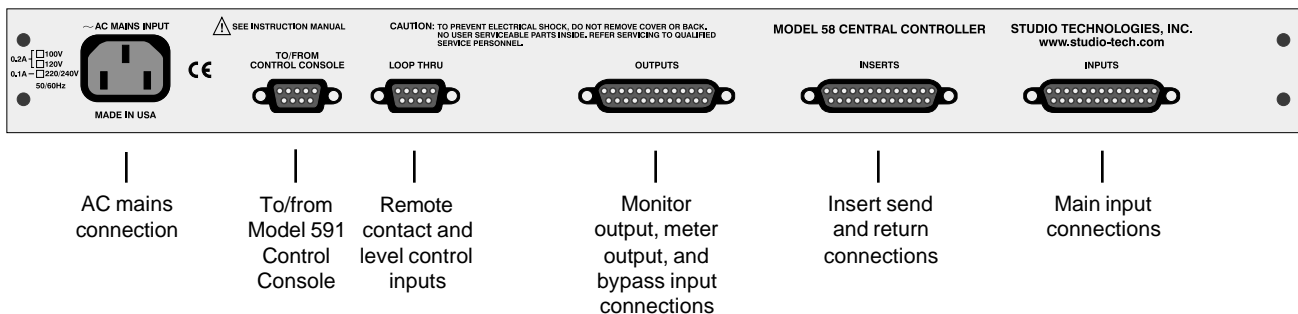
Figure 3. Model 591 Control Console Front Panel

The StudioComm's two insert sections are directly accessible using push-button switches. While they can perform a standard insert action, they can also be used to provide a wide range of muting, routing, and summing functions. Each insert can be configured, on a per-channel basis, to act in one of four modes: Mute, maintain connection of the normal signal, insert the return signal in place of the normal signal, or sum the return signal with the normal signal.

Control of individual monitor output channels is provided by the mute/solo section. One push-button switch sets the operating mode for either mute or solo. In the mute mode, an individual channel can be muted or unmuted as required. In the solo mode, a channel can be monitored while the other is automatically muted. The flexibility of having both mute and solo available allows an operator to quickly select the

most comfortable and productive operating mode.

A major strength of the Model 591 is the ability to configure, under software control, many operating parameters. During initial installation the Model 591 is "taught" how it should function. All configuration parameters are stored in non-volatile memory.

The Model 591 Control Console connects to the Model 58 Central Controller using a standard 9-pin D-subminiature cable. Power for the Model 591 is provided by the Model 58. The Model 591 generates MIDI system-exclusive messages to control the Model 58. Remote control signals connect to the Model 58, then travel on to the Model 591 via pins in the 9-pin interconnecting cable.

Remote Control Capability

Three remote control functions are provided: Contact input 1, contact input 2, and

level. Contact input 1 can be configured as either a remote mute all or a remote bypass function. Contact input 2 can be used to remotely enable insert 1 or 2, or to activate the dim function. Using a standard linear-taper potentiometer, a remote level control can be implemented; no special optical encoder or buffer circuitry is required.

The remote control functions were specifically included to support external functions such as talkback or intercom. They also allow the creation of secondary monitoring positions. Producers, directors, or other persons who deem themselves to be important, often find this to be convenient. Provision has been made in the Studio-Comm's operating software to ensure that critical listening is not affected by remote activity.

Applications

Inserts

The Model 58 insert sections are applicable for far more than the usual console-provided insert functions. Under control of the Model 591 Control Console, each channel of each insert section can independently function in one of four modes: Mute the normal signal flow, maintain the normal signal flow, replace the normal signal with the return signal, or sum (combine) the return signal with the normal signal. (Note that in all cases the insert send signal will remain active.) With this flexibility the inserts can be used for a variety of insert, routing, and mixing functions.

Remote Control

Provision has been made to allow remote control of several system functions. Contact input 1 allows remote activation of the mute all or bypass functions. Contact input 2 allows remote activation of the insert 1, insert 2, or dim functions. The level control input allows remote control of the monitor output level. The exact functioning of the remote control inputs is dependent upon the configuration of Model 591 Control Console parameters. Refer to the Configuration section of this guide for details.

Remote control of mute all or dim is provided to allow a variety of applications to be supported. Placing a mechanical switch adjacent to a telephone, allowing personnel to conveniently mute the monitor loudspeakers, is a perfectly acceptable application. Allowing a talkback system to automatically dim the monitor loudspeakers is another typical application.

Remote control of the bypass function is specifically provided to support interfacing with an associated console's PFL/solo system. By connecting contact input 1 to a switch or contact closure that indicates when the PFL/solo system is active, audio signals connected to the bypass inputs will automatically be monitored.

The remote level control input is one of those features which may rarely be used, but when needed, it'll really be needed! Without having support built into the Model 591 Control Console's hardware and software, it would be almost impossible to add a remote level control later.

The remote level control input, along with the remote mute all and dim functions, makes it simple to create a small control console for secondary locations. The

remote level control input was provided specifically to allow a producer, director, or other "big cheese" to have their own level control for use when previewing audio or video work-in-process.

Note that software "smarts" in the Model 591 Control Console inhibits the use of the remote level control any time the operator selects the reference output level. This ensures that the calibrated monitor level won't accidentally be changed by some maroon. This, along with the remote activity LED indicator on the Model 591, keeps the remote level control from doing more harm than good.

Bypass

The bypass function was expressly provided so that additional monitoring capability can be added to a facility while maintaining compatibility with existing stereo monitoring systems. The bypass signal source would normally be the stereo monitor output of an audio console. During Model 58/Model 591 operation, the monitor outputs are connected, via electromechanical relays, to the Model 58's output circuitry. When the bypass function is enabled, the monitor outputs disconnect from the Model 58's output circuitry, connecting instead to the bypass inputs. Activation of the bypass function can be by means of a button on the Model 591 Control Console, or remotely using a signal connected to contact input 1.

Installation

In this section you will be installing the Model 58 Central Controller in an equipment rack. Audio input, insert, and output connections will be made. A location will be selected for the Model 591 Control Console, and it will be connected to the Model 58. If required, external equipment will be interfaced with the remote control inputs. AC mains power will be connected to the Model 58.

System Components

The shipping carton contains one each of the following: Model 58 Central Controller, Model 591 Control Console, 20-foot (6.1m) 9-pin D-subminiature interconnecting cable, User Guide, and warranty card. Units destined for North America also include an AC mains cord. Your dealer or distributor will provide an AC mains cord for non-North American destination.

Mounting the Model 58 Central Controller

The Model 58 Central Controller requires one space in a standard 19-inch (48.3cm) equipment rack. Select a location that is convenient to both the analog audio signals and the Model 591 Control Console. A 20-foot (6.1m) cable is supplied to connect the Model 58 to the Model 591. You can supply your own interconnecting cable, however 50 feet (15.3m) is the recommended maximum length. Secure the Model 58 in the equipment rack using two mounting screws per side.

Audio Connections

Audio signal connections are made by way of three 25-pin D-sub connectors, located on the Model 58's back panel. Three cable harnesses, each with a 25-pin D-sub plug (male) on one end and the desired connectors on the other end, are necessary. These cable harnesses are not supplied

by Studio Technologies. Note that our friends in some locations may use the term "loom" instead of harness.

Main Inputs

The connector labeled INPUTS is used to interface the audio sources with the eight main input circuits. Note that when used with the Model 591 Control Console, main inputs 5-8 are not supported. Please refer to Figure 4 for details on the exact "pin out" of the D-sub connector. The electronically balanced circuitry is intended for connection to balanced or unbalanced sources with a nominal signal level of +4dBu. A trim potentiometer is associated with each main input, allowing adjustment of the input sensitivity over a ±2dB range. The configuration sections of this guide provides details on using the trim pots.

Connection	Signal High (+)	Signal Low (–)	Shield
MAIN IN 1	24	12	25
MAIN IN 2	10	23	11
MAIN IN 3	21	9	22
MAIN IN 4	7	20	8
MAIN IN 5 (Note 3)	18	6	19
MAIN IN 6 (Note 3)	4	17	5
MAIN IN 7 (Note 3)	15	3	16
MAIN IN 8 (Note 3)	1	14	2

Notes: 1) Connector type on Model 58 is 25-pin D-subminiature female. Installer must provide plug (male). Connector uses 4-40 threaded inserts for locking with mating plug.

2) Wiring scheme follows Tascam DA-88 convention. Standard DA-88-type wiring harnesses are directly compatible, with the exception of 4-40 screw threads being required.

3) Main inputs 5-8 are not supported by the Model 591 Control Console.

Figure 4. Connections for Main Inputs

Balanced sources should be wired so that signal high is connected to + on the D-sub, signal low to – on the D-sub, and shield to the D-sub's shield connection. With an unbalanced source connect signal high to the + connection on the D-sub, and shield to both the – and the shield connection on the D-sub. If connecting to an unbalanced source in this manner results in hum or noise, connect signal high to + on the D-sub, and shield to – on the D-sub; leave the shield connection unterminated.

Monitor Outputs

The connector labeled OUTPUTS provides access to the two, 2-channel monitor outputs. Please refer to Figure 5 for details on the exact "pin out" of the D-sub connector.

The monitor outputs are intended for connection to audio amplifiers associated with monitor loudspeakers, or to the inputs of loudspeakers with integrated amplifiers. Note that there are two monitor output circuits which are switched, using relays, to the 2-channel A and B output connections. During operation only one set of outputs, A or B, will be active at the same time. An output which is not active has a short-circuit placed across its connections.

Note: While the Model 58's electronically balanced output circuits are capable of driving loads of 600 ohms or greater, the output level will drop slightly as the load impedance approaches 600 ohms. A 0.5dB difference in output level can be expected as the load impedance changes from 10k ohms to 600 ohms. This applies to all of the electronically balanced output circuits provided on the Model 58.

Connection	Signal High (+)	Signal Low (−)	Shield
MONITOR OUT A-1 (L)	24	12	25
MONITOR OUT A-2 (R)	10	23	11
MONITOR OUT B-1 (L)	21	9	22
MONITOR OUT B-2 (R)	7	20	8
METER OUT 1 (L)	18	6 (See Note 3)	19
METER OUT 2 (R)	4	17 (See Note 3)	5
BYPASS IN 1 (L)	15	3	16
BYPASS IN 2 (R)	1	14	2

Notes: 1) Connector type on Model 58 is 25-pin D-subminiature female. Installer must provide plug (male). Connector uses 4-40 threaded inserts for locking with mating plug.

2) Wiring scheme loosely follows Tascam DA-88 convention. Modified DA-88-type wiring harnesses are required, along with 4-40 screw threads.

3) Meter outputs are unbalanced. Pins 6 and 17 internally connected to Model 58 shield.

Figure 5. Connections for Monitor Outputs, Meter Outputs, and Bypass Inputs

The monitor outputs are electronically balanced and are capable of driving balanced or unbalanced loads of 600 ohms or greater. While balanced operation is preferred, unbalanced operation does not pose a problem. To connect to an unbalanced load connect the + terminal of the D-sub as signal high, and both the − and shield as the signal low/shield. For optimal unbalanced operation, it is important to connect both − and shield together directly on the D-sub, and not where the cable terminates at the far end.

Meter Outputs

The connector labeled OUTPUTS provides access to the 2-channel meter output. Please refer to Figure 5 for details on the exact "pin out" of the D-sub connector.

The same source, or sources, that feed the monitor output feeds to meter output. The major difference is that the meter output is not affected by the monitor output level control circuitry; it is pre-fader (pre-VCA).

The meter output is intended for connection to the inputs of various mechanical, electronic, or electromechanical meter systems. The meter output can also serve as an additional audio output for special applications, such as a copy or "dub" output. In addition, the meter output serves an important role in the input calibration process, which is discussed in the Configuration section of this guide.

The meter output is unbalanced, has a nominal level of +4dBu, and is capable of driving loads of 600 ohms and greater. Even if the meter output is not going to be used during normal operation it is important to provide access to it. To correctly and accurately calibrate the system input-to-output gain an audio level measurement device must be able to be temporarily connected to the meter output. While not absolutely necessary, terminating or routing the meter output to points on an audio patch bay may prove very helpful for long-term maintenance assistance.

Bypass Inputs

The connector labeled OUTPUTS provides access to the 2-channel bypass input. Please refer to Figure 5 for details on the exact "pin out" of the D-sub connector. It is usual for the source connected to the bypass input to be from the stereo monitor output of an audio console or other monitoring system.

Warning: It is very important that signals connected to the bypass input be "post" a level control, i.e., attenuated from line level. Connecting a standard line level audio signal can result in damage to monitor loudspeaker systems or, more critically, to the ears of listeners.

Balanced sources should be wired so that signal high is connected to + on the D-sub, signal low to – on the D-sub, and shield to the D-sub's shield connection. With an unbalanced source the connection method depends on the requirements of the monitor speaker system's input. This is because routing of the bypass input to the monitor outputs does not involve any active circuitry. Whenever the bypass feature is active, the signal connected to the bypass inputs is simply passed through to the associated monitor output channels by means of electromechanical relay contacts.

Insert Sends and Returns

The connector labeled INSERTS is used to interface with the two 2-channel insert sections. Please refer to Figure 6 for details on the exact "pin out" of the D-sub connector. The use of the insert sections will depend on the requirements of the specific installation. In many cases the inserts sections won't be required, and no connections will need to be made.

The insert sends are electronically balanced, have a nominal level of +4dBu, and are capable of driving balanced or unbalanced loads of 600 ohms or greater. While balanced operation is preferred, unbalanced operation is not a problem. To connect to an unbalanced load connect the + terminal of the D-sub as signal high,

and both the – and shield as the signal low/shield. For optimal unbalanced operation, it is important to connect both – and shield together directly on the D-sub.

Note that the insert sends do not have level trim potentiometers associated with them. The output levels are nominally +4dBu, with channel-to-channel variation of up to ±0.5dB considered normal. It is anticipated that the equipment connected to the insert sends will have, if required for correct operation, input level adjustment controls.

The insert returns are electronically balanced, have a nominal input level of +4dBu, and are compatible with balanced or unbalanced sources. Connections should be made in the same fashion as the main inputs, described previously.
A trim pot is associated with each insert return, allowing the input sensitivity to be adjusted over a ±2dB range. Refer to the Configuration section of this guide for details on using the trim pots.

Connection	Signal High (+)	Signal Low (–)	Shield
SEND 1-1 (L)	24	12	25
RETURN 1-1 (L)	10	23	11
SEND 1-2 (R)	21	9	22
RETURN 1-2 (R)	7	20	8
SEND 2-1 (L)	18	6	19
RETURN 2-1 (L)	4	17	5
SEND 2-2 (R)	15	3	16
RETURN 2-2 (R)	1	14	2

Notes: 1) Connector type on Model 58 is 25-pin D-subminiature female. Installer must provide plug (male). Connector uses 4-40 threaded inserts for locking with mating plug. 2) Wiring scheme loosely follows Tascam DA-88 convention. Modified DA-88-type wiring harnesses are required, along with 4-40 screw threads.

Figure 6. Connections for Inserts

Remote Control Connections

The remote control input circuitry is physically located in the Model 591 Control Console. Access to the remote control inputs is by way of the 9-conductor cable that links the Model 591 with the Model 58 Central Controller. In fact, five of the nine connections in this cable are dedicated for use by the remote control inputs and have nothing directly to do with the Model 58 Central Controller. Since all pins of the Model 58's two 9-pin D-sub connectors are connected in parallel, access to the remote control inputs is made using the connector labeled "Loop Thru" on the Model 58. Refer to Figure 7 for a detailed description of the 9-pin D-sub connections.

Contact input 1 and contact input 2 are +5V logic signals which are active when they are brought to the logic low state. While the inputs are protected from over-current and static (ESD) discharge care should be taken to prevent nasty signals from reaching them. To activate contact input 1 simply connect pin 5 to data common, pin 4. To activate contact input 2 connect pin 6 to pin 4. The contact inputs are active when held in the low state; they can't be configured to change states ("latch") in response to a logic pulse.

All that is required to add a remote level control is to connect a commonly available linear taper potentiometer. (Yes, use a linear pot! Software in the Model 591 Control Console converts its performance to logarithmic.) Any high-quality pot with a nominal "coil" resistance of between 1k and 25k ohms should work fine. Simply connect the "Loop Thru" D-sub to the pot in this fashion: Pin 7 to counterclockwise, pin 8 to wiper, and pin 9 to clockwise. As very little current (amps) travels through

Pin	Signal	Direction
1	Power Supply Common, Cable Shield	Model 58 unit to Model 591
2	+15Vdc	Model 58 unit to Model 591
3	Data	Model 591 to Model 58 unit
4	Data Common	Model 591 to Model 58 unit
5	Contact Input 1	Remote Contact to Model 591
6	Contact Input 2	Remote Contact to Model 591
7	CCW	Remote Level Potentiometer to Model 591
8	Wiper (Level Control)	Remote Level Potentiometer to Model 591
9	CW	Remote Level Potentiometer to Model 591

Notes: 1) Connector type on Model 58 is 9-pin D-subminiature female. Connector uses 4-40 threaded inserts for locking with mating plug.

Figure 7. Connections for Control Console and Remote Control Inputs

the wiring and pot, there is really no practical maximum cable length. Be aware that the longer the cable run, the more chance that an accidental short circuit could take place. This is a serious issue, as a short circuit could cause the monitor output level to go to maximum.

Warning: Connecting to the remote level control input requires very careful attention to wiring and potentiometer connections. Shorting pin 8 of the 9-pin D-sub connector to common will raise the monitor output level to maximum! To address hearing safety issues, the Model 591 is default configured to disable the remote level control input. A safe and reliable installation must be completed prior to enabling the input.

Connecting the Model 591 to the Model 58

A cable with 9-pin D-sub plugs (males) on each end is used to interconnect the Model 591 Control Console with the Model 58 Central Controller. A 20-foot (6.1m) cable is provided with each Model 58/ Model 591 system. Connect one plug to the Model 58 connector labeled "To/From Control Console," the other plug to the Model 591.

Should a cable of different length be required it should be wired in a one-to-one fashion for all 9 pins. Pin 1 carries power supply common, and must be interconnected using a conductor. A cable shield connection should be connected to pin 1 at one, or both, ends.

For best performance the cable generally should not exceed 50 feet (15.3m) in length. The reality is that a cable much longer in length should work, as long as an excellent-quality cable is utilized. We define "excellent" as extensive shielding along with very low capacitance. The low cable capacitance limits the amount of data-signal waveform distortion. As far as the maximum length, go ahead and try it—if it works, it works!

AC Mains Power

The Model 58 is internally configured to operate from either 100, 120, or 220/240V, 50/60Hz. Units shipped to North America are factory selected for 120V operation. Units bound for Japan are selected for 100V, while our friends "down under" and in Europe receive units set for 220/240V. Before connecting the Model 58 to mains power, check that it is configured to match the local mains voltage. Look on the back

panel (adjacent to the power entry connector) for the configured voltage(s). Note than an incorrect configuration could seriously damage the unit. Should it be necessary to change the unit's operating voltage it must be performed only at the factory or by an authorized service technician.

The Model 58 uses an IEC standard connector to mate with the AC mains cord. The wire colors in the AC mains cord should conform to the internationally recognized CEE color code and must be wired accordingly:

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

Safety Warning: The Model 58 does not contain an AC mains disconnect switch. As such, the mains cord plug serves as the disconnection device. Safety consideration requires that the plug and associated outlet be easily accessible to allow rapid disconnection of mains power should it prove necessary.

As soon as mains power is applied, the power-present LED on the Model 58 will light. The Model 591 will go through its power-up sequence lighting each LED in a rapid sequence.

Note that any time one of the Model 58's configuration DIP switches is changed, mains power must be disconnected and reconnected. This ensures that the logic circuitry is fully reset to match the new operating parameters. (This is not a bug in software—we designed it this way to

ensure that performance would always be correct!) Refer to the Configuration section of this guide for details on setting the DIP switches.

Configuration

After the physical installation has been completed, several configuration issues must be addressed. On the Model 58 Central Controller, the unit ID and operating mode must be set. In addition, the main input, insert return, and monitor output signal levels must be calibrated using trim potentiometers. As a final step, the operating parameters of the system will be set using the Model 591 Control Console's configuration mode.

Model 58 DIP Switches

The Model 58 Central Controller must be "taught," using the front panel DIP switches, its unit ID and operating mode. This is required to support operation with the Model 591 Control Console. DIP switches 1-4 provide the Model 58 with its unit identification number. To support a Model 591 the unit ID must be one, which is selected by setting all four switches to the off (down) position. DIP switches 5 and 6 set the Model 58's operating mode. To the support the Model 591 switch 5 must be in the off (down) position, while switch 6 must be in the on (up) position. DIP switches 7 and 8 are not currently supported by the Model 58, but are best left in the off (down) position. So to summarize, to support a Model 591 Control Console requires DIP switches 1-5 and 7-8 to be in the off (down) position; switch 6 must in the on (up) position.

Note that any time one of the Model 58's DIP switches is changed the data LED, located to the right of the switches, will flash. This is normal, being provided for factory confirmation of correct switch operation.

Once the DIP switches have been correctly set the AC mains power must be disconnected, then reconnected. This causes the previous configuration to be erased, and the new one implemented. Failure to perform this step will prevent the Model 58 from reacting to changes made to the DIP switches.

Failure to perform a fresh "power up" after changes have been made to the DIP switches will prevent correct operation!

Level Calibration

Fourteen multi-turn trim potentiometers grace the front panel of the Model 58 Central Controller. Eight are provided for the main inputs, four for the insert returns, and two for the monitor outputs. Taking time to carefully adjust the trim pots will ensure that accurate monitoring can take place. Each trim pot allows an adjustment range of ±2dB, which is spread over the trim pot's 15 turns. Calibrating the levels down to a tenth of a dB is easily performed.

The meter outputs are used as the measuring point when adjusting 12 of the 14 trim pots. Unless calibrated level meters are already connected to the meter outputs, an external audio level meter is required. In addition, the audio sources connected to the main inputs must be configured to generate steady signals at nominal operating level. Those interested

in where the trim pots are located in the circuitry, and why the meter outputs are specified as a measurement point, should refer to the Model 58 Block Diagram, available from Studio Technologies, Inc.

Main Input Trim Pots

This first procedure will ensure that the Model 58 main inputs are level matched against each other. It is assumed that calibrated metering devices are not already connected to the meter outputs.

1. On the Model 58, connect the audio level meter to meter output 1.

2. Using the Model 591 Control console, select main input 1 to be routed to the left monitor output. Be certain that inserts 1 and 2 are not enabled. Enable the mute all function, ensuring that you won't have to hear a steady tone during the entire procedure!

3. Confirm that the audio source connected to main input 1 is generating a steady signal at precisely its reference level. (This is assumed to be nominally +4dBu.)

4. Observing the level meter, adjust main input trim pot 1 to give a +4dBu level at meter output 1.

5. Repeat steps 1-4 for main inputs 2, 3, and 4.

Insert Return Trim Pots

Describing the calibration process for the insert returns is a bit more difficult as the exact implementation of the insert sections is dependent upon the specific installation. The goal is to have no unwanted level change to occur when switching an insert section between disabled and enabled.

Note that the insert sends are not calibrated for a precise +4dBu nominal level. Trim pots on the insert returns allow level inaccuracies in the insert sends, as well as the connected device's input and outputs, to be accounted for.

The following procedure would be appropriate when an insert section is configured to place another device in the audio path, replacing the original. This procedure assumes that main input calibration has already been performed. It is also assumed that calibrated metering devices are not permanently connected to the meter outputs.

1. On the Model 58, connect the audio level meter to meter output 1.

2. Using the Model 591 Control console, select main input 1 to be routed to the left and right monitor outputs. Confirm that inserts 1 and 2 are disabled. Enable the mute all function, ensuring that you won't have to hear a steady tone during the entire procedure!

3. Confirm that the audio source connected to main input 1 is generating a steady signal at precisely its reference level.

4. Observing the level meter, confirm that the output level is exactly +4dBu. (If this is not the case, the main input trim pot must be re-calibrated.)

5. Using the Model 591 Control Console, enable insert 1.

6. Observing the level meter, adjust the trim pot associated with insert 1, return 1 to give a +4dBu level at meter output 1.

7. Repeat steps 4, 5, and 6 for insert 1, return 2.

8. If insert 2 is being utilized, repeat the procedure for its two return trim pots.

Monitor Output Trim Pots

A trim potentiometer is associated with each of the two monitor output circuits. Note that while there are two 2-channel monitor output connections—A and B—there are only two output circuits. Relay contacts are used to switch the output circuits between the A and B connections. Installation-specific requirements will dictate how the monitor output trim pots need to be adjusted. In most cases the trim pots will be adjusted to give exactly the same output level on the two monitor output channels. Other installations may require the trim pots to be adjusted in reference to the outputs of the audio power amplifiers. For this discussion, we'll describe how to match the output levels of the monitor outputs. Note that this procedure assumes that input calibration has already been performed.

1. Start by turning off the AC mains power on the audio power amplifier. If loudspeakers with integrated amplifiers are being used, turn them off too. This "power down" is critical, ensuring that high-level test signals do not get sent to the loudspeakers. Don't mess around—turn off the amps now!

2. Confirm that the audio source connected to main input 1 is generating a steady signal at precisely its reference level.

3. Using the Model 591 Control Console, select main input 1 as the audio source for the left and right monitor outputs. Ensure that other inputs are off. Enable monitor output A. Confirm that inserts 1 and 2, as well as the mute all and dim functions are disabled. Slowly turn the rotary level control clockwise. If audio is heard, stop raising the level and turn off any active amplifiers. Turn the level control until it is fully clockwise, providing the maximum monitor output level.

4. Connect the precision audio level meter to channel 1 of monitor output A.

5. Observing the level meter, adjust monitor output trim pot 1 to give exactly +4dBu.

6. Disconnect the level meter and connect it to channel 2 of monitor output A.

7. Observing the level meter, adjust the monitor output 2 trim pot to give exactly +4dBu.

8. On the Model 591 Control Console, turn the output level control to the fully counterclockwise position.

9. After confirming that the level control is fully counterclockwise, activate AC mains power on the audio amplifier or amplified speakers.

Model 591 Operating Parameters

Many StudioComm functions can be configured to meet the exact needs of your installation. Here's an overview of what you can configure:

- Input source presets

- Insert operation

- Monitor output mode

- Power-up mute mode

- Channels selected for bypass and bypass mode

- Reference level

- Dim level

- Remote contact inputs and level control

The Model 591 Configuration Charts, located at the end of this section, give details on how each configuration parameter is set. An overview of the parameters is provided in the following paragraphs.

Entering the Configuration Mode

A small button is located on the back of the Model 591 Control Console, adjacent to the 9-pin D-sub connector. Pressing and holding this button for two seconds places the Model 591 into the configuration mode. In the configuration mode the buttons and LEDs no longer perform their normal function, but instead allow you to observe and change many of the operating parameters. The mute/solo mode LEDs light alternately to indicate that the configuration mode is active. Once again pressing and holding the configure button returns the Model 591 to normal operation. Note that configuration changes are stored only after the configuration mode is exited by pressing and holding the button.

Our apologies to those of you who find the configure button a pain to use, but it's supposed to be that way! Seriously, the top of the button is slightly recessed from the back panel, making it harder to accidentally activate.

When to Use the Configuration Mode

There is no problem frequently "tweaking" the Model 591's operating parameters to achieve the desired performance. The non-volatile memory chip used to store the configuration is rated for thousands of read and write cycles, and has a retention time rated in years.

Insert Operation

Configuring the insert sections is an excellent test of your manual dexterity. If you have any doubts about your ability, don't chew gum at the same time! The insert sections are unique in their ability to be configured on a channel-by-channel basis. Each channel of each insert section can be independently set for one of four operating modes: Mute normal signal, maintain normal signal flow, replace the normal signal with the insert return signal, or mix the insert return signal with the normal signal. A detailed explanation of each mode follows:

Mode 1: Mute normal signal. In this mode no signal flows through the insert section. This is effectively a channel mute function. The insert send continues to be active, but the insert return is not active.

Mode 2: Maintain normal signal flow. In this mode the normal audio signal continues to flow through the insert section. This is effectively a "no-insert function" function! The insert send continues to be active, but the insert return is not active.

Mode 3: Replace the normal signal with the insert return signal. This is the conventional insert function that most audio consoles provide. The normal signal no longer flows through the insert section. The return signal is connected into the signal path. The insert send continues to be active.

Mode 4: Mix the insert return signal with the normal signal. In this mode the normal signal continues to flow through the insert section, with the insert return signal mixed (summed) with it. No level change is performed, they are mixed at nominal level.

Any level reduction required to prevent "buildup" needs to be done externally. The insert send continues to be active.

A special mode has been included to allow an insert section to be disabled from operation. This is accomplished by configuring all eight channels associated with each insert section to mode 2, maintain normal signal flow. With this configuration an operator can press the associated insert button "till the cows come home" and the function will never activate. This is another attempt at making the Model 591 "idiot proof." The factory default configuration has the two insert functions disabled.

Monitor Output Mode

While the Model 58 Central Controller supports the connection of two sets of monitor loudspeakers, often only the A output will be used. The monitor output A/B select button on the Model 591 Control Console can be disabled, preventing an operator from selecting output B. Only the A LED will be lit, and the button will be inactive. The factory default configuration is for monitor output to follow A/B select.

Power-up Mute Mode

By factory default, upon application of AC mains power the monitor outputs remain muted until a power-up sequence has been performed. Then the monitor outputs are returned to their respective states as left at the time of the previous loss of AC mains power. There may be special uses where having the monitor output channels remain muted until an operator manually presses the mute all button is desired. Use the configuration button to select the desired power-up mute-all operation.

Remote Level Control

Two configuration choices are associated with the remote level control function: Disabled and enabled. To utilize the function, simply configure it for enabled; the factory default is for remote level control to be disabled.

> **Warning:** It is imperative that the wiring of the remote level control be carefully implemented before the function is enabled. To not do so risks damage to the monitor loudspeakers and, more importantly, the ears of listeners.

Channels Selected for Bypass

Each monitor output channel can be configured to either mute, or connect to its associated bypass input signal when the bypass function is active. How the channels are configured simply depends on which bypass input channels have signals connected to them.

A special mode has been included to allow the bypass function to be disabled from operation. To disable the bypass function, simply select both output channels to mute during bypass. The factory default configuration has the bypass function disabled.

Bypass Mode

The bypass mode can be configured to operate in one of three modes: Monitor output A only, monitor output B only, or follow the state of the monitor output A/B button. The first two modes cause their respective monitor outputs to be active when in the bypass mode.

Note that even if the monitor output mode is configured for A only, setting the bypass mode to monitor output B only will cause

monitor output B to become active when the bypass mode is active. Also, when the bypass mode is configured to follow the A/B button, the monitor output mode must be configured to allow A/B operation or only monitor output A will be enabled during bypass operation. The factory default is for the bypass function to follow the state of the monitor output A/B select button.

Reference Level

For audio-with-picture applications it's critical that mixing be done in reference to a known monitor loudspeaker level. This is often referred to as mixing to "85dB" on the monitors. The Model 591 Control Console allows a precise monitor output level to be stored, and then enabled by pressing the button labeled REF. The factory default is for the reference level to be set for full attenuation. Setting a usable reference level is very simple:

1. Set up a precision sound pressure level (SPL) measuring device at the desired listening location.

2. Place the StudioComm system in the normal operating mode, not the configuration mode. Be certain that the reference, mute all, dim, and insert functions are not active.

3. Use the Model 591 Control Console to select the reference signal source, e.g., pink noise, to the left and right monitor outputs.

4. Observing the SPL meter, adjust the Model 591's rotary level control until the desired reference level has been reached.

5. Being careful not to touch the position of the rotary level control, enter the

configuration mode by pressing and holding the configure button, located on the Model 591's back panel.

6. Once the configuration mode has been entered, the monitor output signal will mute. Press and hold the reference button until its associated LED lights. This will take 5 seconds. The LED lights to indicate that a "snapshot" of the new reference level has been taken.

7. To store the new reference level in memory, exit the configuration mode by again pressing and holding the configure button.

This level is now permanently stored as the reference level. Only by repeating the procedure can the value be changed.

Once the configuration mode has been exited, the monitor output will again become active. Confirm that the correct level has been stored by pressing the reference button. The SPL meter should again display the desired level. If not, repeat the calibration process.

You might wonder why you have to press and hold the reference button for 5 seconds before the value is stored. This is provided specifically so that some Bozo won't accidentally change the ref level while they are playing around in the configuration mode! You have to know the "secret" to be able to store a new value.

Input Source Presets

The input source presets can be individually configured to match commonly used monitoring scenarios. Any, or all, of the input routing buttons can be selected for each of the input source presets. As an example, the factory default for input

source preset A was selected to be: Input 1 routed to the left monitor output; Input 2 routed to the right monitor output. This might be a typical audio source coming from a broadcast tape playback machine, or a satellite receiver. To cover monitoring a secondary audio source from the same playback machine or satellite receiver, the factory default for input source preset B is: Input 3 routed to left; input 4 routed to right.

A special mode has been included to allow an input source preset to be disabled from operation. To disable an input source preset, simply have no input source selected for routing to the left or right monitor output channels. The factory default configuration for input source presets C and D are disabled.

Dim Level

The dim function is used to reduce the monitor output level by a preset amount. The reduction is in dB relative to the monitor output's current level. Select the desired dim level from the four that are available: 10, 15, 20, or 25dB. The factory default is for a 15dB dim level.

Contact Input 1

Three configuration choices are associated with contact input 1: Disabled, remote mute all, and remote bypass. Select the desired operating configuration. The factory default for contact input 1 is disabled.

Contact Input 2

Four configuration choices are associated with contact input 2: Disabled, remote insert 1, remote insert 2, and remote dim. Select the desired operating configuration. The factory default for contact input 2 is disabled.

Restore Factory Defaults

The restore factory defaults function is provided primarily for factory use. In this way a system can be shipped with the default settings selected. While you are welcome to use this function, be careful that your configuration efforts are not wasted. Specifically, note that restoring the factory defaults configures the reference level to minimum level. All the other parameters are fairly easy to set up, but resetting the ref level would require getting out the SPL meter and a calibrated signal source. This is a hassle you may not need!

Model 591 Configuration—Entering and Exiting Configuration Mode

Press and hold the configure button for 2 seconds to enter or exit the configuration mode.
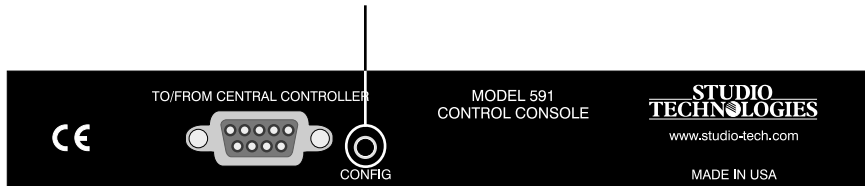
These LEDs will light alternately when the configuration mode is active.
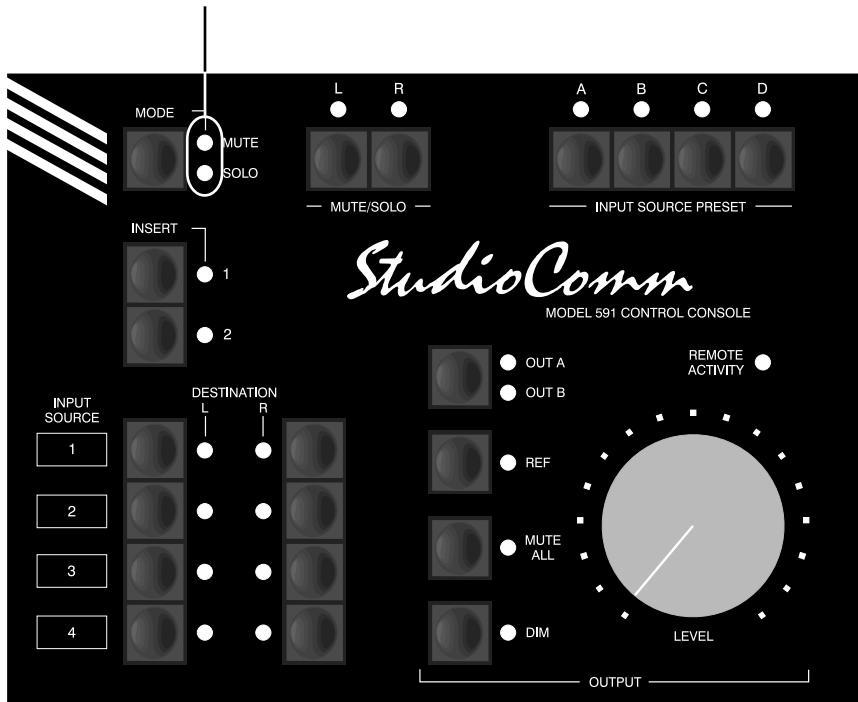
Model 591 Configuration—Insert 1 and 2

☞ Press and hold one of the insert buttons to allow the display and selection of the insert mode.

When an insert button is pressed, pressing the output channel buttons (one at a time) allows the display and selection of the insert mode for that specific channel.
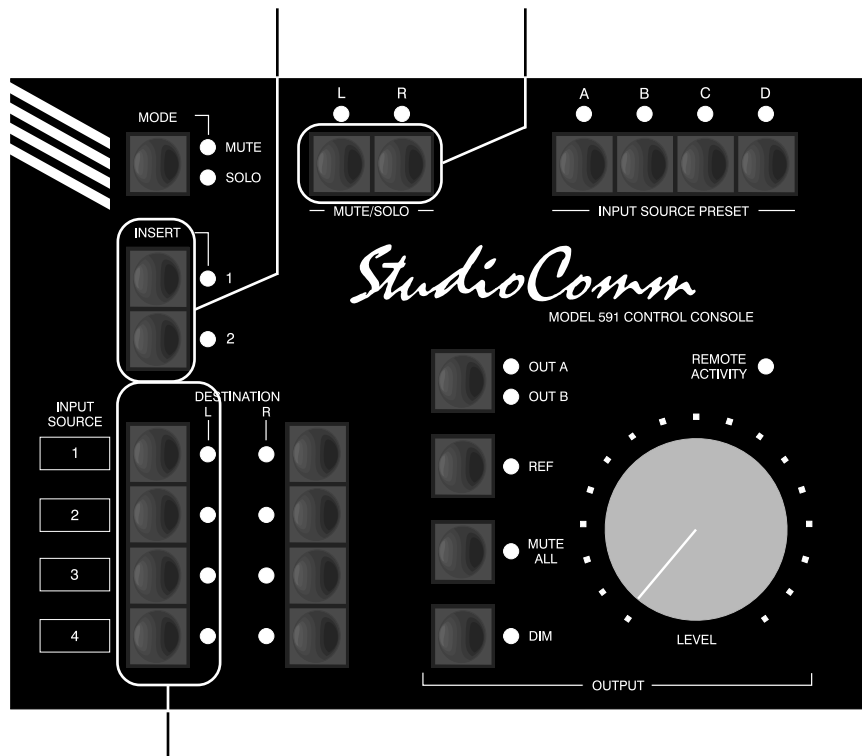
When an insert button and an output channel button
are pressed at the same time, the insert mode is displayed.

LED 1-L lit means mode 1: Mute normal signal flow;
LED 2-L lit means mode 2: Maintain the normal signal flow;
LED 3-L lit means mode 3: Replace the normal signal with the return signal;
LED 4-L lit means mode 4: Sum (combine) the return signal with the normal signal.

Use the buttons to select the mode.

Default: Both channels associated with both inserts are in mode 2: Maintain the normal signal flow; function disabled.

Note 1: This is the hardest configuration to understand and perform! Two buttons must be simultaneously pressed to display the mode; three buttons must be simultaneously pressed to change the mode. A little practice and it will become easy.

**Note 2:** If both channels associated with an insert section are set for mode 2, that insert section will be set for disabled. This feature is provided so that the operator won't attempt to enable an unused insert, hopefully minimizing confusion.

Model 591 Configuration—Monitor Output Mode, Power-Up Mute Mode, and Remote Level Control Input

When the monitor output A/B select button is pressed, these LEDs display the monitor output mode. When LED L is lit the mode is A only. When LED R is lit the mode is A/B select. Use the buttons to select the monitor output mode.

When the monitor output A/B select button is pressed, these LEDs display the power-up mute mode. When LED A is lit power-up mute mode is disabled. When LED B is lit power-up mute mode is enabled. Use the buttons to select the mode.

When the monitor output A/B select button is pressed, these LEDs display the status of the remote level control input. LED C lit means that the remote level control input is disabled. LED D lit means that the remote level control input is enabled. Use the buttons to select the status.
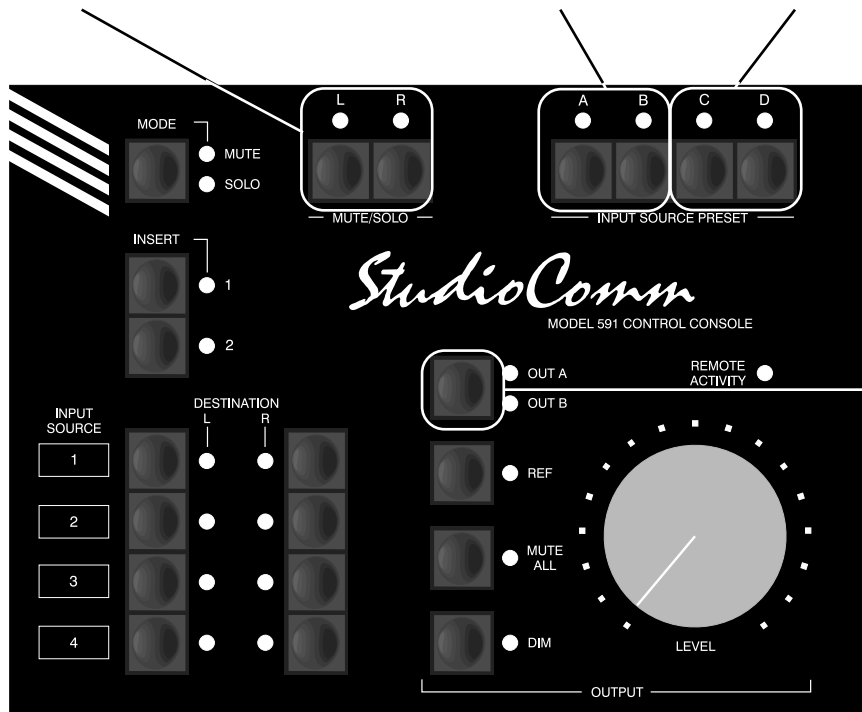

Press and hold the monitor output A/B select button to display and select the monitor output mode, power-up mute mode, and remote level control input.

Default: Monitor output mode is A/B select.
Power-up mute mode disabled.
Remote level control input disabled.

Model 591 Configuration—Channels Selected for Bypass and Bypass Mode

When the mute all button is pressed, these LEDs display the monitor output channels selected for bypass. A lit LED indicates that the channel is selected for bypass. Use the buttons to change the configuration. Both LEDs flash to indicate neither channel is selected for bypass; bypass function disabled.
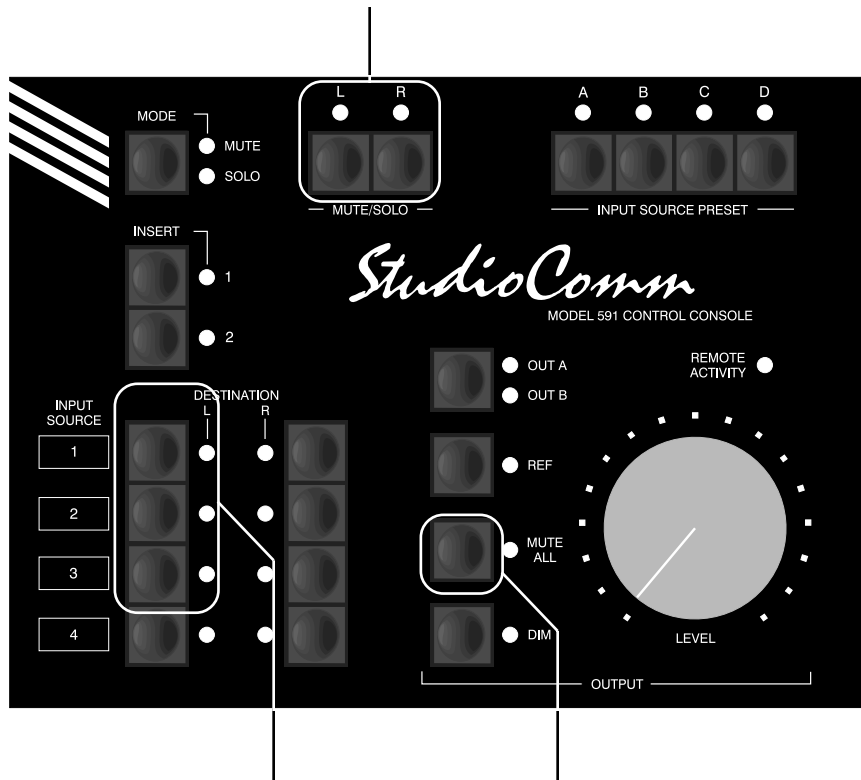
When the mute all button is pressed, these LEDs display the bypass mode. The bypass mode indicates which monitor output will be active when the bypass function is enabled.

LED 1-L lit means monitor output A;
LED 2-L lit means monitor output B;
LED 3-L lit means follow monitor output A/B select button.

Use the buttons to select the mode.

Press and hold the mute all button to display and select the channels selected for bypass and the bypass mode.

Default: Neither channel selected for bypass; function disabled.
Bypass mode is follow monitor output A/B select button.

Note: A special bypass mode is available. By selecting neither channel to be associated with bypass, the bypass function will no longer be available during normal operation.

StudioComm

Model 591 Configuration—Reference Level and Input Source Preset

When the Ref button is pressed, press and hold the L button for 5 seconds to take a "snapshot" of the rotary level control's present setting. The reference LED will light when the "snapshot" has been taken.

When the Ref button is pressed, pressing an input source preset button (one at a time) allows the display and selection of the input sources. All LEDs flash to indicate no sources are selected for that input source preset.
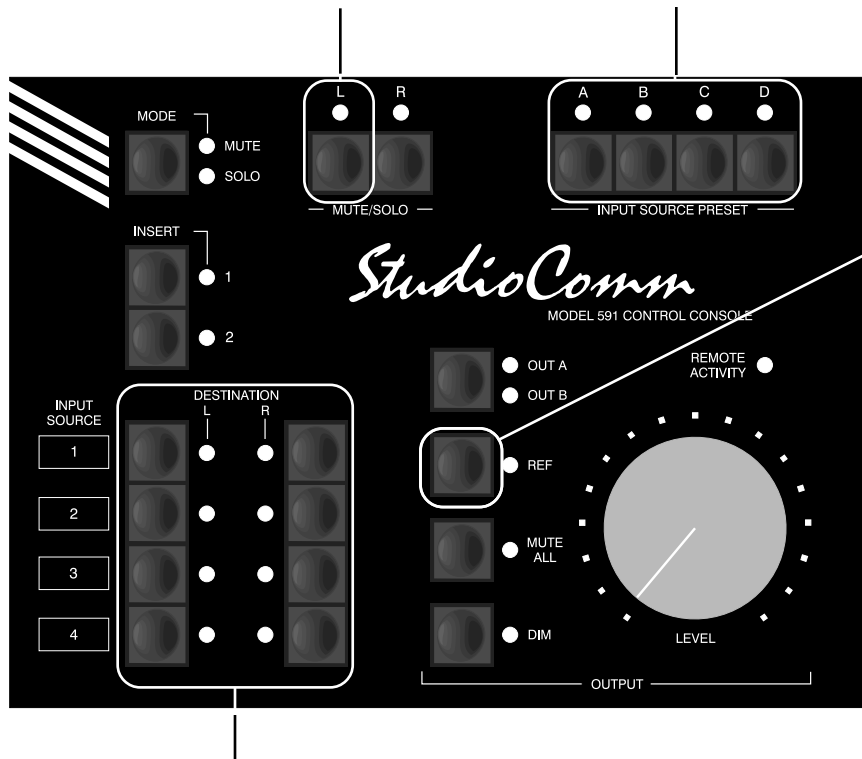
Press and hold Ref button to select the reference level and display and select the insert source presets.

When the Ref button and an input source preset button are pressed at the same time, the input source preset is displayed. Use the buttons to select the desired inputs.

Default: Reference level is set for fully attenuated (minimum) monitor output level.
Input source preset A set for input 1 routed to L, input 2 routed to R.
Input source preset B set for input 3 routed to L, input 4 routed to R.
Input source preset C set for no input selected; function disabled.
Input source preset D set for no input selected; function disabled.

**Note:** The 5-second delay is a safety feature, ensuring that the reference level will not be accidently changed. To permanently store the new value, you must still exit the configuration mode.

A special input source preset mode is available. By selecting no input sources to be associated with an input source preset, that specific input source preset function will no longer be available during normal operation.

Model 591 Configuration—Dim Level and Contact Inputs

When the dim button is pressed, these LEDs display the status of contact input 1. LED L and LED R flashing means that the input is disabled. LED L lit means that the input provides a remote mute all function. LED R lit means that the input provides a remote bypass function. Use the buttons to change status.

When the dim button is pressed, these LEDs display the status of contact input 2. LED A lit means that the input is disabled. LED B lit means that the input provides a remote insert 1 function. LED C lit means that the input provides a remote insert 2 function. LED D lit means that the input provides a remote dim function. Use the buttons to change status.
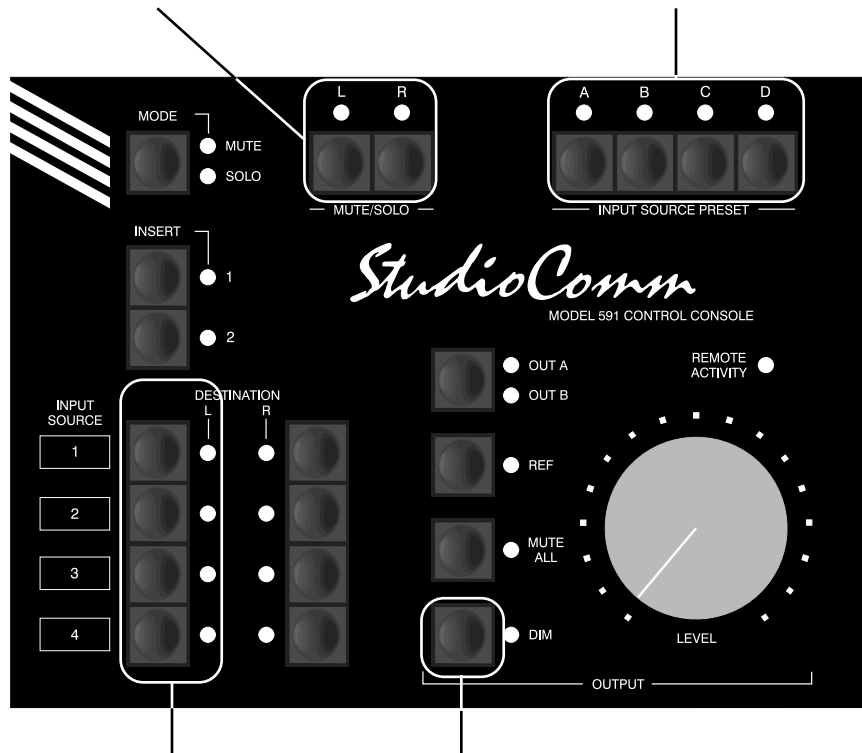
When the dim button is pressed, these LEDs display the selected dim level:

LED 1-L lit means 25dB dim;
LED 2-L lit means 20dB dim;
LED 3-L lit means 15dB dim;
LED 4-L lit means 10dB dim.

Use the buttons to select the dim level.

☞ Press and hold the dim button to display and select the dim level and contact inputs.

Default: 15dB dim level.
Contact input 1 disabled.
Contact input 2 disabled.

Model 591 Configuration—Restore Factory Defaults

☞ Press and hold both insert buttons for 5 seconds to restore Model 591 factory defaults. Once defaults have been restored, the LEDs will light. After buttons are released, configuration mode will be maintained.
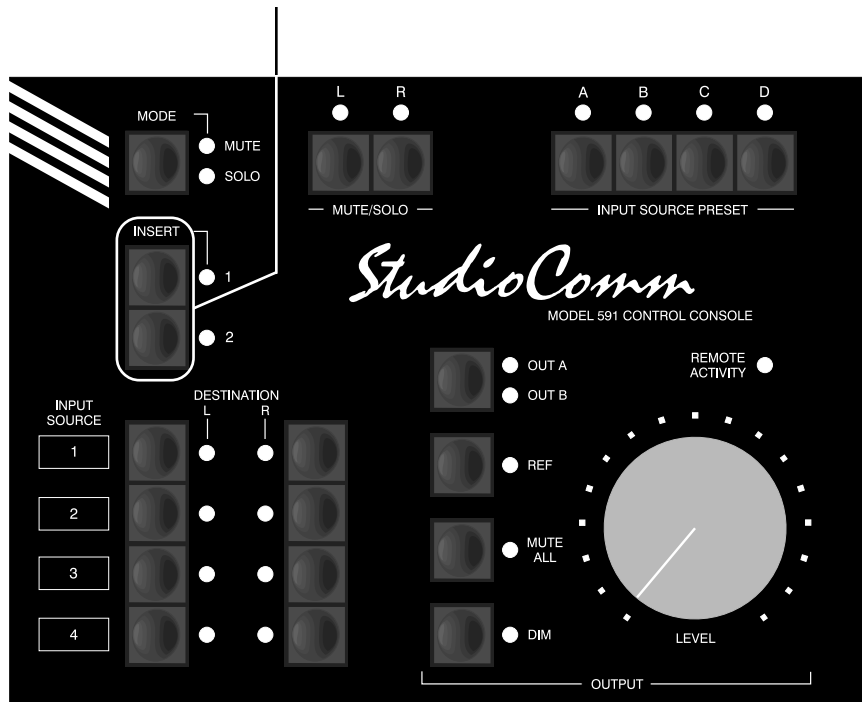
Factory Defaults: Both channels associated with both inserts are in mode 2: Maintain the normal signal flow; functions disabled.
Monitor output mode is A/B select.
Power-up mute mode is disabled.
Remote level control input disabled.
No channels selected for bypass; function disabled.
Bypass mode is follow monitor output A/B select button.
Reference level is set for fully attenuated (minimum) monitor output level.
Input source preset A set for input 1 routed to L, input 2 routed to R.
Input source preset B set for input 3 routed to L, input 4 routed to R.
Input source preset C set for no input selected; function disabled.
Input source preset D set for no input selected; function disabled.
15dB dim level.
Contact input 1 disabled.
Contact input 2 disabled.

Note: The 5-second delay is a safety feature, ensuring that the factory defaults will not be accidently restored.

Operation

Now that you've installed and configured the system, you're ready to go. You should find operation very easy.

Model 58 Central Controller

The Model 58 front panel contains two LEDs. The power LED should be lit whenever AC mains power is connected. The data LED will light whenever a MIDI system-exclusive message matching the Model 58's configuration is received.

Model 591 Control Console

StudioComm functions are controlled using the Model 591 Control Console and, if installed, the contact inputs and remote level control. To make things easy to describe, we've divided the functions into six main groups: Input source selection, inserts, monitor output general functions, mute/solo, bypass function, and remote controls.

Input Source Selection

Input source selection is simple. To select an input source for routing to the meter and monitor outputs, press one of the input source buttons. The corresponding LED will light to let you know that the input has been selected. You can select more than one button simultaneously; up to all eight. The selected inputs will be summed (combined) for each channel.

Input Source Preset

Activating one of the input source presets simply requires pressing the desired button: A, B, C, or D. When an input source preset has been selected, its associated LED will be lit and the input

routing selected for that preset will take effect. The LED associated with the input preset button will remain lit until a change has been made to the input routing. This change can occur as a result of any one of the input routing buttons being pressed, or because another input source preset has been selected. A special configuration allows an insert source preset to be disabled. If this configuration has been selected, pressing its associated button will result in no action occurring.

Inserts

Activating the two insert sections is as simple as pressing the desired insert button. When an insert function is active, its associated LED will be lit. Because of the flexibility that is built into the insert functions, it may be important for an operator to understand how each insert function is configured. An insert may be configured to operate in the usual manner (substituting a processing device into the audio path) or may be used for a summing, routing, or muting function.

A special configuration mode allows an insert to be disabled. This would be appropriate if an insert section was not going to be used. In this case, pressing that insert button would result in no action. This is the factory default

Monitor Output General Functions

Four buttons and one rotary control are associated with the monitor output function. The buttons are A/B output select, reference level, mute all, and dim. The rotary level control is used to set the monitor output level.

A/B Output Select

The A/B button is used to select the monitor output to be connected to the Model 58's output circuitry. Two LEDs are associated with the button, displaying the active output. Pressing the button "toggles" between the A and B outputs. There is a special configuration that allows this button to be disabled. This would be appropriate if connections were made only to output A. If this configuration has been selected, pressing the A/B button will result in no action occurring.

Reference Level

The reference level button, labeled REF, sets the monitor output level to a preset value. This level is normally set, at the time of system installation, by a technician, using a sound-pressure-level (SPL) meter. The LED associated with the reference level function lights steadily whenever the function is active. When reference level mode is active the rotary level control is disabled, as is the remote level control input function.

The reference LED also serves as a calibration aid. If the reference level mode is not active, and the rotary level control is set at precisely the same level as that configured as the reference level, the reference LED will flash. This also holds true for the remote level control, if configured.

Mute All

The mute all function is highly complicated to operate—not! Pressing the mute all button causes the active monitor output (A or B) to mute. The LED associated with the mute all button will light whenever mute all is active. Note that if mute all is enabled via the remote mute all function, the mute all LED will flash, along with the remote activity LED.

Dim

The dim function is quite self-explanatory. Press the dim button to enable the dim mode, which will reduce the monitor output level by a preset amount. The dim button is always set to "latch" the function on and off. Dim activity applies no matter whether the monitor output level is being set by the rotary control, the reference button, or, if configured, the remote level control. The dim level can be configured for 10, 15, 20, or 25dB, so one of those values will apply when dim is active. The LED associated with the dim button will light whenever dim is active. Note that if dim is enabled via the remote dim function, the dim LED will flash, along with the remote activity LED.

What's not so self-explanatory is the auto-dim-off function. Whenever dim is enabled due to the dim button being pressed, and reference mode is not active, changing the rotary level control or, if configured, the remote level control, will automatically turn off dim. The auto dim off function is a unique attempt at protecting the health of audio engineers. No longer will there be a heart-stopping blast of audio when the dim button is pressed, supposedly to enable dim, but actually turning it off because dim was already enabled. It's hard to explain unless you've used an audio console and experienced this in person—trust us, this situation does happen! Auto dim off is a wonderful "real-world" function.

Note that the auto dim off function is not active whenever dim is on due to the remote dim function being active. This allows remote control equipment, such

as a talkback system, to reliably dim the monitor outputs.

Rotary Level Control

The rotary level control is used to manually adjust the monitor output level. It is active any time the reference level function is not active. When the rotary level control is set to give the same output level as the preset reference level, the reference LED will flash. Note that when the level control is set to its fully counterclockwise position, maximum attenuation is achieved, but not a full mute. The mute all function should be used to fully mute the monitor outputs.

The rotary level control and, if configured, the remote level control work together in an interesting fashion. The control which was turned last sets the monitor output level. This makes it very simple to move from using one control to the other, with no remote enable/disable buttons or switches to activate.

As a visual aid, if the monitor output level is changed using the remote level control, the remote activity LED on the Model 591 will flash. This LED will continue to flash until a monitor-output-level-related parameter on the Model 591 changes. Level-related parameters include turning the rotary level control, or enabling the reference level, mute all, or dim functions. The remote activity LED flashes in this manner as a warning, preventing an operator from wondering why the level has "mysteriously" changed. A change in monitor level can have serious consequences to an audio mix, so this LED serves as an alert that a change has occurred. Remember, if you are worried about the monitor level being changed remotely during an important mix, use the reference level function

to "lock out" the local and remote level controls.

Mute/Solo

The mute/solo mode button and the two monitor output channel buttons, along with associated LEDs, work together to provide excellent flexibility. The mute/solo mode button allows the operator to select between industry-standard mute and solo functions. The mute and solo functions use the mute relays in the Model 58 to enable or disable output channels. Going from mute mode to solo mode, or vice-versa, clears all active mutes or solos. Pressing the mode button twice is a legitimate means of quickly clearing a muted or soloed channel.

In the mute mode, a channel that is muted has its associated LED turned on. In the solo mode a channel that is soloed has its associated LED flash on and off, while the LED of the non-soloed channel is not lit.

Bypass Function

To enter the bypass mode, press and hold the mute all button for 2 seconds. All LEDs will stop lighting, except those associated with mute all and A/B output select. The mute all LED will activate with a "double flash" pattern to indicate that bypass is active. Depending on how the system was configured, the A/B output button may, or may not, function during bypass mode. Note if the bypass function has been disabled, pressing and holding the mute all button will have no effect.

To exit the bypass mode, press and hold the mute all button for 2 seconds. Normal operation will then resume.

Remote Controls

Two contact signals and a potentiometer can be connected to the system and configured for the desired operating characteristics. Contact input 1 can be configured for remote mute all or remote bypass. Contact input 2 can be configured for remote insert 1, remote insert 2, or remote dim. The remote level control function allows a way of remotely controlling the monitor output level.

When remote mute all is activated the LED on the Model 591 associated with mute all will flash. If mute all was already active when the remote mute all function is activated, the LED will change from being lit to flashing. The remote activity LED on the Model 591 will flash simultaneously as confirmation of a remote control signal being active.

When remote bypass is activated, the mute all LED on the Model 591 will flash, as will the remote activity LED. The A/B output select LED will light, indicating the active monitor output. If configured to do so, the A/B button will continue to function during remote bypass.

When remote insert 1 is activated the LED on the Model 591 associated with insert 1 will flash. The remote activity LED on the Model 591 will flash simultaneously as confirmation of a remote control signal being active.

When remote insert 2 is activated the LED on the Model 591 associated with insert 2 will flash. The remote activity LED on the Model 591 will flash simultaneously as confirmation of a remote control signal being active.

When remote dim is activated the LED on the Model 591 associated with the dim function will flash. If dim was already active when remote dim is activated, the LED will change from being lit to flashing. The remote activity LED on the Model 591 will flash simultaneously as confirmation of a remote control signal being active.

Technical Notes

Monitor Output Gain Structure

The Model 58 Central Controller's monitor outputs are configured for unity gain. When the rotary level control on the Model 591 Control Console is set for maximum level (fully clockwise) the output level is essentially the same as the main input level. Trim potentiometers allow precise adjustment of the monitor output level. This was provided so that slight level variations caused by the Model 58's circuitry and the associated power amplifiers could be "trimmed out."

Definition of Level—dBu

Whenever possible, 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 0dBm is 1 milliwatt dissipated in the known load (i.e., 0dBm across 600 ohms will measure 0.775V). In contemporary situations an output is rarely terminated with 600 ohms; generally 10k ohms or higher. The dBu designation is better because it refers to dB referenced to 0.775V, with no reference to load impedance. This takes into account today's audio scene where signals have a low source impedance, and a high input impedance. The dBu designation is becoming the standard for the professional audio industry.

"Hot" Disconnection of the Model 591 Control Console

Should you need to relocate the Model 591 while your StudioComm system is operating, there is no reason why you can't disconnect the cable, move the unit, and then connect it again. If the Model 591 is disconnected while it is operating, the current operating parameters are saved in nonvolatile memory and the Model 58 Central Controller will continue to operate as when the link was broken. No clicks, pops, or other noises will occur when the Model 591 is again connected. The Model 591 will go through its standard power-up sequence, send a message to reset power-up defaults, then send the operating parameters as stored in its memory. You may notice a brief interval of silence while the Model 58 responds to the reset defaults and operating parameter messages.

Power Amplifier Input Sensitivity

Optimum StudioComm performance is obtained when the input sensitivity of the associated audio power amplifier (or amplified loudspeakers) is adjusted to match the Model 58's monitor output level. With normal, but loud, listening levels you should find the level potentiometer on the Model 591 set to about the "2-'clock" position. If you find that you don't have to turn up the Model 591's control that high, reduce the input sensitivity of the power amplifier until you get to the 2-o'clock position. Most power amplifiers, or amplified loudspeakers, have controls on their inputs to allow easy adjustment of the input sensitivity.

Monitor Output Transient Protection

The Model 58 Central Controller contains a power-up/power-down transient protection feature. This limits the chance of damage to the monitor loudspeakers during the time when AC mains voltage is connected, disconnected, or has significantly changed from nominal. A combination of hardware and software is used to monitor one of the Model 58's power supply "rails." Until the DC voltage exceeds 81% of its nominal, electromechanical relays maintain a short circuit condition on the A and B outputs. After a short delay the relays are allowed to function normally. Whenever the DC voltage drops below 79% of its nominal voltage, the relays immediately go to their mute state. During testing it was found that upon power-up the outputs remained very quiet; during power down a moderate "tick" was the worst that was heard.

Specifications

Model 58 Central Controller

General Audio:

Frequency Response: 20Hz-20kHz ±0.1dB (down 1dB @ 85kHz), monitor out

Distortion (THD+N): 0.01%, measured at 1kHz, +4dBu, monitor out

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

Crosstalk: 78dB, ref +4dBu in

Main Inputs: 8 (4 supported when used with Model 591 Control Console)

Type: electronically balanced

Impedance: 24k ohms

Nominal Level: +4dBu, adjustable ±2dB

Bypass Inputs: 1, 2-channel

Type: balanced, passive, no circuitry associated with input

Switching: bypass inputs switched to monitor outputs using sealed, bifurcated relay contacts

Inserts: 2, 2-channel

Send Type: electronically balanced

Send Nominal Level: +4dBu

Send Maximum Level: +27dBu into 10k ohms, +26dBu into 600 ohms

Return Type: electronically balanced

Return Impedance: 24k ohms

Return Nominal Level: +4dBu, adjustable ±2dB

Monitor Outputs: 2, 2-channel

Type: electronically balanced

A/B Switching: sealed, electromechanical relays, output circuitry shared by both outputs

Nominal Level: unity gain, adjustable ±2dB

Maximum Output Level: +27dBu into 10k ohms, +26dBu into 600 ohms

Meter Output: 1, 2-channel

Type: unbalanced

Nominal Level: +4dBu

Maximum Level: +21dBu into 10k ohms, +20dBu into 600 ohms

Connectors:

Audio: 3, 25-pin D-subminiature female

Control: 2, 9-pin D-subminiature female

AC Mains: 3-blade IEC-type

AC Mains Requirement:

100, 120, or 220/240V, ±10%, factory configured, 50/60Hz

Dimensions (Overall):

19.00 inches wide (48.3cm)
1.72 inches high (4.4cm)
8.75 inches deep (22.2cm)
(1 standard rack space)

Weight: 8.0 pounds (3.6kg)

Model 591 Control Console

Application: operator interface that connects to Model 58 Central Controller

Power: provided by Model 58 Central Controller

Output Data: generates MIDI system-exclusive messages

Remote Control Inputs: 2 contact, 1 potentiometer

Connector: 1, 9-pin D-subminiature female

Dimensions (Overall):

7.2 inches wide (18.3cm)
2.2 inches high (5.6cm)
5.4 inches deep (13.7cm)

Weight: 2.0 pounds (0.9kg)

Specifications subject to change without notice.

Appendix A

Controlling the Model 58

The Model 58 Central Controller uses MIDI system-exclusive messages to control all functions. The Model 591 Control Console is programmed to generate a subset of what the Model 58 is capable of doing. By using standard MIDI messages, the Model 58 can be used for a wide range of special applications. Any device that can be programmed to send system-exclusive MIDI messages can be used to control the Model 58.

While it is perfectly acceptable for devices other than the Model 591 Control Console to generate the MIDI system-exclusive codes to "drive" the Model 58 Central Controller units, a hardware detail must be noted. The architecture of the Model 58 was created so that up to 8 units could be connected together. A standard MIDI hardware implementation would not allow an output to drive this number of inputs. To solve this problem the input impedance of the Model 58's MIDI input was raised from the normal 220 ohms to 2000 ohms, and, on the Model 591, a more sophisticated output circuit was implemented. The output circuit is essentially a current source that can easily drive up to eight of the modified inputs.

From our very limited tests, connecting one or two Model 58 units to a standard MIDI output works correctly. However, connecting more than one or two will not work reliably, or at all. Several solutions to this problem are available. A custom hardware implementation can duplicate

the Model 591's output circuit, which consists of a few low-cost components. Alternately, the Model 58's MIDI input impedance can be changed to 220 ohms by simply changing one resistor. This will again limit the number of Model 58 units that can be driven by a standard MIDI output, but three or four should function correctly. Schematic diagrams are available to purchasers of StudioComm systems. Contact the factory for details.

General Notes:

All MIDI messages to be acted upon are system-exclusive type (F0H). No channel mode, system common, or system real time messages are utilized.

Studio Technologies, Inc. manufacturer's ID number is 00H 00H 56H

The Model 58's product device ID number is 03H.

Function: Reset to Power-Up Default Configuration

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	00H	Function, Restore Power-Up Default Configuration
7	F7H	EOX, End of System Exclusive

Notes: Action taken after message is received:
Set all input sources to off.
Set all monitor output channels to off.
Set monitor output level to minimum.
Set monitor output A/B to both off.
Set insert 1 to all normal.
Set insert 2 to all normal.
Bypass set to normal.

Function: Input Source and Associated Channels

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	01H	Function, Input Source and Associated Channels
7	0nH	Input Source, range 1-8, 1=input source 1, 2=input source 2, etc.
8	nnH	Input Channel Status Bit Map (sum values from all seven channels): Channel 1: off=00; on=01 Channel 2: off=00; on=02 Channel 3: off=00; on=04 Channel 4: off=00; on=08 Channel 5: off=00; on=10 Channel 6: off=00; on=20 Channel 7: off=00; on=40
9	0nH	Input Channel Status Channel 8: off=0; on=1
10	F7H	EOX, End of System Exclusive

Function: Monitor Output Channel Status

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	02H	Function, Output Channel Status
7	nnH	Monitor Output Channel Status Bit Map (sum values from all seven channels): Channel 1: off=00; on=01 Channel 2: off=00; on=02 Channel 3: off=00; on=04 Channel 4: off=00; on=08 Channel 5: off=00; on=10 Channel 6: off=00; on=20 Channel 7: off=00; on=40
8	0nH	Monitor Output Channel Status Channel 8: off=0; on=1
9	F7H	EOX, End of System Exclusive

Note: Mute all function is implemented using the output A/B status command, not the monitor output channel status command.

Bypass status takes priority over monitor output channel status.

Function: Monitor Output Level - Normal

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	03H	Function, Monitor Output Level - Normal
7	nnH	Monitor Output Level, MSB, range 00-7F
8	0nH	Monitor Output Level, LSB, range 0-1
9	F7H	EOX, End of System Exclusive

Notes: Control console sends new value each time monitor output level is changed.

Monitor output level is 8-bit precision, spread over two MIDI bytes: 00H 00H lowest; 7FH 01H highest. MIDI byte 7 is monitor output level bits 2-8; MIDI byte 8 is monitor output level bit 1.

Dim function is performed by control console and is sent using monitor output level command.

This function is in effect only when monitor output channel status is on and bypass status is normal.

Function: Monitor Output Level - Reverse

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	04H	Function, Monitor Output Level - Reverse
7	nnH	Monitor Output Level, MSB, range 00-7F
8	0nH	Monitor Output Level, LSB, range 0-1
9	F7H	EOX, End of System Exclusive

Notes: Not sent by control console. Provided for special applications.

Output level is 8-bit precision, spread over two MIDI bytes: 00H 00H highest; 7FH 01H lowest. MIDI byte 7 is monitor output level bits 2-8; MIDI byte 8 is monitor output level bit 1.

This function is in effect only when monitor output channel status is on and bypass status is normal.

Function: Monitor Output A/B Status

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	05H	Function, Monitor Output A/B Status
7	0nH	Monitor Output A/B Bit Map (sum values from both channels): A: off=0; on=1 B: off=0; on=2
8	F7H	EOX, End of System Exclusive

Notes: This function is used by monitor output channel status and bypass status.

Output A/B status is used to mute all channels by setting byte 7 to 0.

Function: Insert 1 Status

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	06H	Function, Insert 1 Status
7	nnH	Insert Bit Map (sum values from all three channels): Channel 1: mute=00; normal=01; replace=02; sum=03 Channel 2: mute=00; normal=04; replace=08; sum=0C Channel 3: mute=00; normal=10; replace=20; sum=30
8	nnH	Insert Bit Map (sum values from all three channels): Channel 4: mute=00; normal=01; replace=02; sum=03 Channel 5: mute=00; normal=04; replace=08; sum=0C Channel 6: mute=00; normal=10; replace=20; sum=30
9	nnH	Insert Bit Map (sum values from both channels): Channel 7: mute=00; normal=01; replace=02; sum=03 Channel 8: mute=00; normal=04; replace=08; sum=0C
10	F7H	EOX, End of System Exclusive

Function: Insert 2 Status

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	07H	Function, Insert 2 Status
7	nnH	Insert Bit Map (sum values from all three channels): Channel 1: mute=00; normal=01; replace=02; sum=03 Channel 2: mute=00; normal=04; replace=08; sum=0C Channel 3: mute=00; normal=10; replace=20; sum=30
8	nnH	Insert Bit Map (sum values from all three channels): Channel 4: mute=00; normal=01; replace=02; sum=03 Channel 5: mute=00; normal=04; replace=08; sum=0C Channel 6: mute=00; normal=10; replace=20; sum=30
9	nnH	Insert Bit Map (sum values from both channels): Channel 7: mute=00; normal=01; replace=02; sum=03 Channel 8: mute=00; normal=04; replace=08; sum=0C
10	F7H	EOX, End of System Exclusive

Function: Bypass Status (Supported by Model 58 units with serial number 00315 and later.)

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	08H	Function, Bypass Channel Status
7	nnH	Bypass Channel Status Bit Map (sum values from all seven channels): Channel 1: normal=00; bypass=01 Channel 2: normal=00; bypass=02 Channel 3: normal=00; bypass=04 Channel 4: normal=00; bypass=08 Channel 5: normal=00; bypass=10 Channel 6: normal=00; bypass=20 Channel 7: normal=00; bypass=40
8	0nH	Bypass Channel Status Channel 8: normal=0; bypass=1
9	F7H	EOX, End of System Exclusive

Notes: Normal indicates that channel follows monitor output channel status.

Bypass status takes priority over monitor output channel status.

Function: Input Source to Output 2 (Supported by Model 58 units with serial number 00315 and later.)

Byte	Value	Description
1	F0H	System-Exclusive Message
2	00H	1st Byte of Studio Tech ID
3	00H	2nd Byte of Studio Tech ID
4	56H	3rd Byte of Studio Tech ID
5	03H	Product ID (Model 58)
6	09H	Function, Right Input Source
7	0nH	Input Source, range 1-8, 1=input source 1, 2=input source 2, etc.
8	nnH	Input Source Channel Status Bitmap (sum values from all seven channels): Channel 1: off=00; on=01 Channel 2: off=00; on=02 Channel 3: off=00; on=04 Channel 4: off=00; on=08 Channel 5: off=00; on=10 Channel 6: off=00; on=20 Channel 7: off=00; on=40
9	0nH	Input Source Channel Status Channel 8: off=0; on=1
10	F7H	EOX, End of System Exclusive

Note: Using this function requires the Model 58's front-panel-mounted DIP switches to be set as follows: Switch 5 to off (down) and switch 6 to on (up).