Radial engineering

SW8™ MK2
Eight Channel Auto-Switcher
Part No. R800 8100 00

User Guide

www.radialeng.com

SW8™ MK2 Auto-Switcher User Guide
Combination Eight Channel Auto Switcher & Transformer Isolated Direct Box

INTRODUCTION

Congratulations on your purchase of a Radial SW8™ Auto-Switcher. The SW8 is designed to provide redundant backup for a multi-track playback system and is equally functional as part of a safety backup system to switch announcements or other messaging. This manual covers the setup and operation of the SW8 in a typical concert setting. Please take a few minutes to read through this manual in order to familiarize yourself with the many innovative features incorporated into the SW8. Inside you will find important safety features along with tips on how to get the most out of your SW8.

Should you have any questions on an application not covered in this manual, we invite you to log onto the Radial web site at radialeng.com to check the SW8's FAQ section for the latest updates. This is also where we post questions from users. If after this you still do not find what you are looking for, feel free to send us an email at info@radialeng.com and we will do our best to reply in short order.

Now get ready to seamlessly switch backing tracks with total confidence!
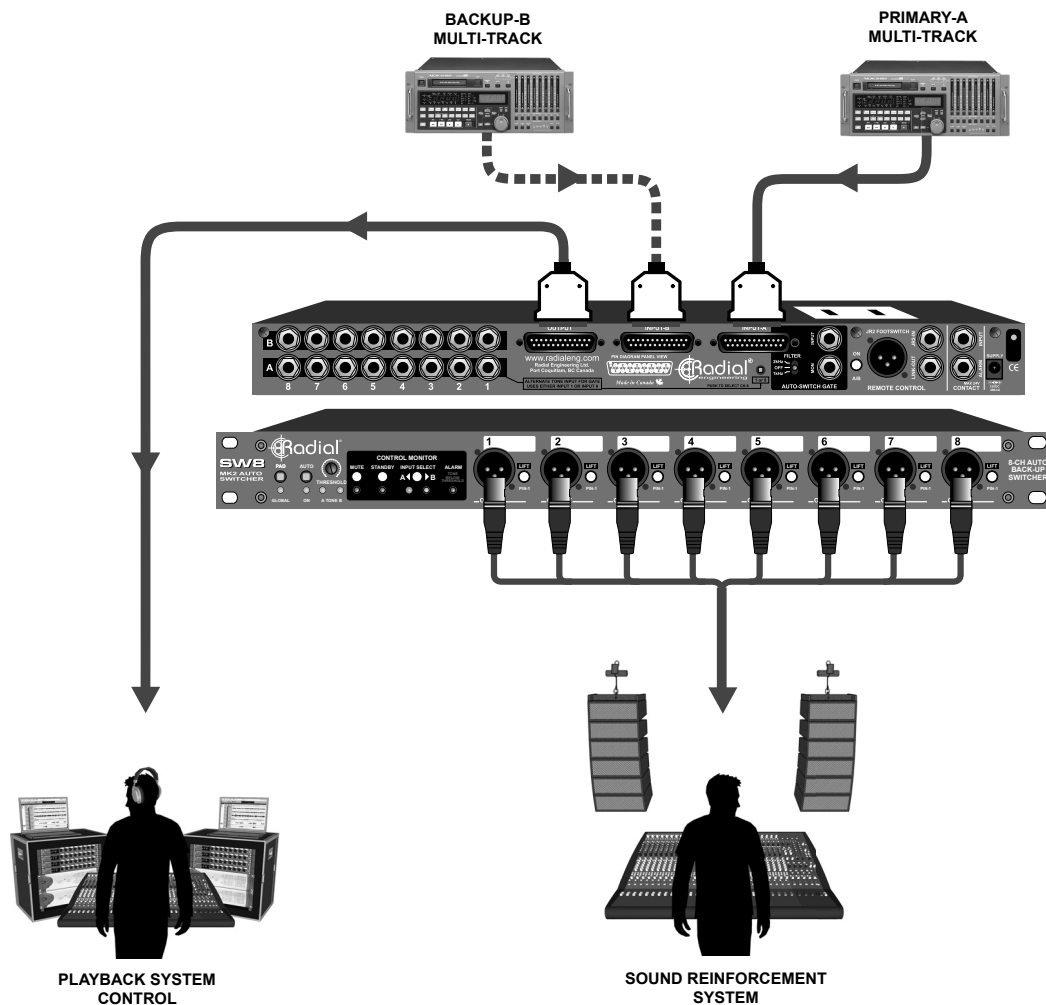

⚠ **PERFORMANCE DISCLAIMER**

The Radial SW8 is an electronic device designed to provide the means to backup other electronic devices. However, like all electronics, the SW8 itself is not totally immune to malfunction. Because the SW8 is designed to integrate with other devices to form a complete system, a critical malfunction may not be obvious until the system is asked to perform. This makes it very important to test your complete playback system before each performance to ensure your system is working as expected.

Radial Engineering Ltd. will not be held liable for any consequential or inconsequential costs or damages associated with the use of the SW8. It is understood that connecting, testing and operating the SW8, along with the application or misapplication, is the sole responsibility of the end user. For more details refer to the Radial limited warranty.

OVERVIEW

The Radial SW8 is an eight channel redundant switcher designed primarily for live concerts where backing tracks are used to reinforce the performance. Should the primary playback machine suffer a failure, the SW8 can switch to a backup machine either automatically, manually, or by remote control.

The SW8 lets you select between two groups of eight audio inputs and route either group to eight discrete outputs. Input connections are made with your choice of standard eight channel 25-pin D-Sub connectors or individual ¼" TRS phone jacks for easy interface with a variety of audio playback systems. Choice of outputs include an eight channel balanced line-level 25-pin D-Sub or eight transformer isolated mic-level XLR outputs. Most system techs employ the D-Sub output to feed their personal payback system for monitoring and use the front panel XLR outputs to connect to the mic splitter and snake system for the PA.

The SW8 can operate in three modes; manual, remote and auto-switch. Depending on your personal preference, experience and confidence with your setup, you will likely choose one of these approaches and stick with it. Some techs prefer a hands-on approach where they run two computers completely separately so that should one fail, the other is autonomous. They will typically start both laptops at the same time and then manually switch between them if a problem is encountered. Others prefer to automate the process whereby they will lock both devices together with time code. Should the master playback system fail the SW8 will automatically switch to the backup.
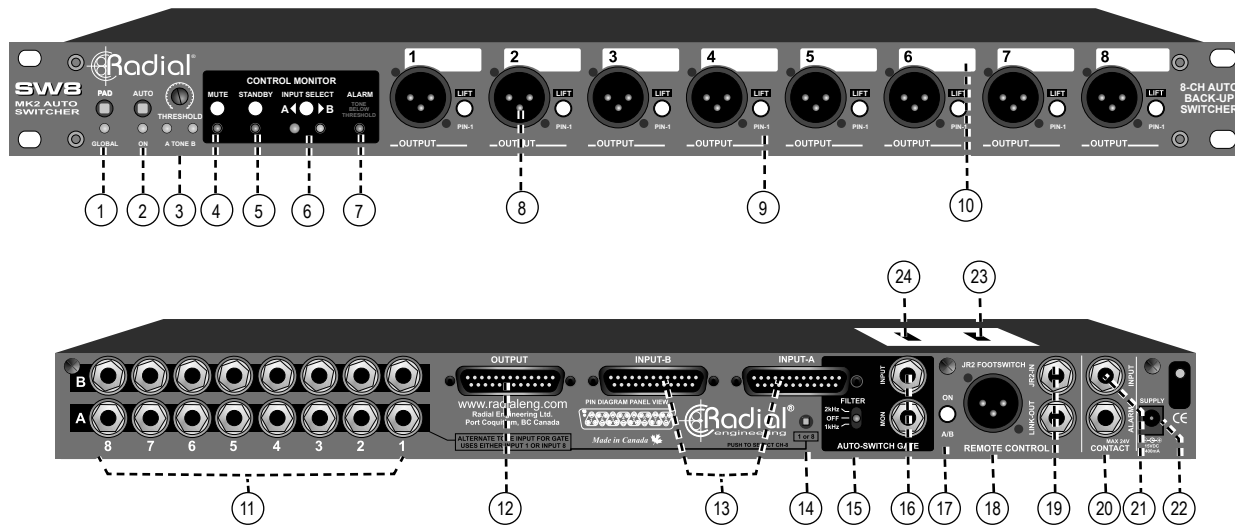
Manual switching is accomplished using the front panel AB select switch. In situations where the SW8 may be remotely stationed, a remote switch may be connected. This can be done using a simple latching footswitch such as the type used on a guitar amp to change channels or turn on a reverb, or by using the optional Radial JR2 remote. This dual-function footswitch gives you control over AB select and standby functions along with LED status indicators. When set to auto-switch mode, the SW8 can detect a machine malfunction and switch to a backup player to ensure a seamless performance. You merely record a 1kHz tone onto the primary recorder (drone track) and send the signal into the SW8's auto-switch gate input on the rear panel. As soon as the drone track disappears, the SW8 diverts the inputs to the backup system. For larger playback system requirements, several SW8 units may be linked together to create 16, 24 or 32 track systems. You simply designate the first SW8 as a master unit and link as many slaves as you like using the JR2 link jacks.

The Radial SW8 has gained international notoriety as is used on stage every day with artists as diverse as U2, Lady Gaga, The Eagles, Radiohead and Cirque Du Soleil.

FEATURES AND FUNCTIONS

Front Panel

1. GLOBAL PAD: Attenuates the signal going to the XLR direct box outputs by -20dB to prevent transformer saturation.

2. AUTO ON: Activates the auto-switching mode. When active it monitors the gate input (channels 1, 8 or direct) for a drone signal and switches from inputs-A to inputs-B if the signal disappears.

3. THRESHOLD: Sets the gate input sensitivity. If the drone signal drops below the set threshold the SW8 will switch from inputs-A to inputs-B. Two level sensing LED's illuminate when signal is detected.

4. MUTE: Turns off the balanced XLR outputs, leaving the balanced D-Sub output on for local monitoring.

5. STANDBY: Holds the auto-switching on inputs-A so that the SW8 does not switch to inputs-B while waiting for drone signal.

6. A-B SELECT: Front panel selector used to manually switch from inputs-A to inputs-B.

7. ALARM LED: Illuminates when the drone signal falls below the set threshold level.

8. XLR OUT: Balanced, low-Z mic-level direct box outputs connect to the PA system and are transformer isolated to help eliminate hum and buzz caused by ground loops.

9. LIFT: Disconnects pin-1 on the XLR output to further assist in reducing noise caused by ground loops.

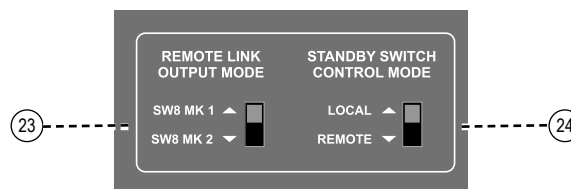10. LABEL STRIP: Easy to read, wax pencil label strip for channel identification and assigment.

Rear Panel

11. TRS ¼" INPUTS-A & B: Two sets of eight balanced or unbalanced line-level inputs for your primary and backup multi-track units.

12. D-Sub OUTPUT: Balanced line-level output is used to send the active input set (A or B) to the PA or local monitor system.

13. D-Sub INPUTS: Balanced line-level A and B inputs are used to connect two multi-track playback units to the SW8.

14. ALT 1/8: Selects between channel 1 or channel 8 to receive the drone track for auto-switching.

15. FILTER: Lets you use a binary audio signal such as SMPTE time code as a drone track by smoothing out the signal for better detection.

16. AUTO-SWITCH GATE INPUT and MONITOR OUTPUT: The ¼" TRS input lets you connect directly to the auto-switching gate. Used as an alternate to channels 1 or 8, so that all eight channels are available for playback tracks. The ¼" monitor output lets you listen to the drone track to ensure it is being received.

17. ON A/B (JR2 FOOTSWITCH): Turns on remote A/B switching when using the optional JR2 footswitch and disables the front panel A/B select switch.

18. JR2 FOOTSWITCH XLR: Connection for the optional JR2 remote footswitch. Lets you remotely switch between A & B inputs and engage the standby mode.

19. JR2-IN and LINK-OUT: ¼" TRS input may be used with the JR2 instead of the XLR. Also used to link multiple SW8's together for larger 16 and 24 channel playback systems.

20. CONTACT ALARM: Tip-sleeve ¼" connection from an internal relay can turn on a siren or beacon when the drone signal drops below the set threshold.

21. CONTACT INPUT: Tip-sleeve ¼" latching contact closure is used to switch the SW8 with a remote footswitch or contact.

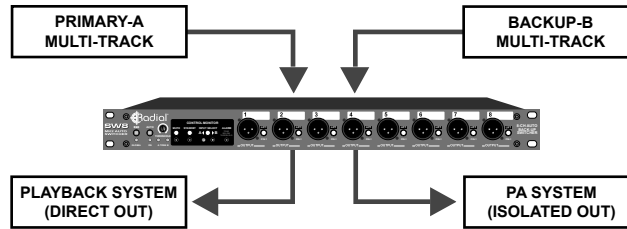22. 15 VDC SUPPLY: Provides power to the SW8. Handy cable lock ensures supply will not be accidentaly disconnected.

Top Panel Switches

23. REMOTE LINK OUTPUT MODE: Used when linking the SW8mk2 to an older SW8(mk1) through ¼" LINK-OUT jack.

24. STANDBY SWITCH CONTROL MODE: Assigns the standby function to either the local front panel switch or the MUTE footswitch on the optional JR2.
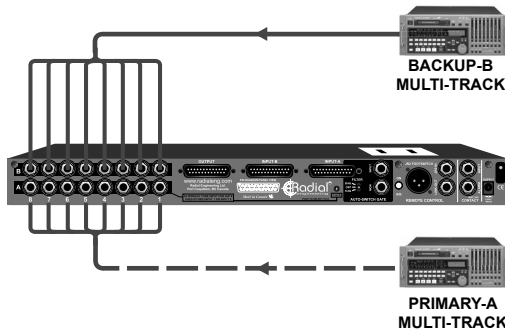
GETTING STARTED

The following considers you will be using the SW8 to switch between two eight channel multi-track machines running in sync and designated as the PRIMARY-A and the BACKUP-B playback systems. The SW8 lets you instantly switch from the PRIMARY-A to the BACKUP-B system and outputs eight isolated channels to the PA system and eight direct channels for local monitoring. If you anticipate switching manually you can fill all eight tracks of your multi-track with audio. If you plan to use the auto-switch function, you will need to record a tone or drone track onto one of the channels. This is explained in detail later in the manual.
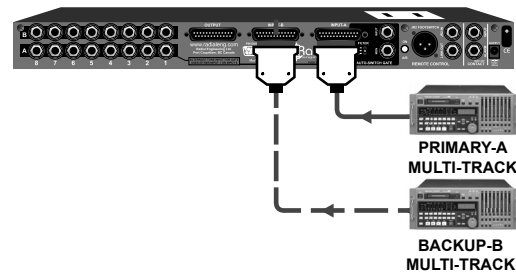
Audio inputs

You can connect your two playback recorders to the SW8 using either ¼" TRS connectors or 25-Pin D-Subs. The balanced TRS connectors are wired to the AES standard with tip (+), ring (-) and sleeve (ground) and the D-Sub is wired following the Tascam / ProTools 8-channel standard. You can find the pin wiring diagram at the back of the manual or on the rear panel of the SW8. Both the ¼" TRS and the 25-pin D-Sub inputs are internaly wired in parallel and work with balanced or unbalanced sources.
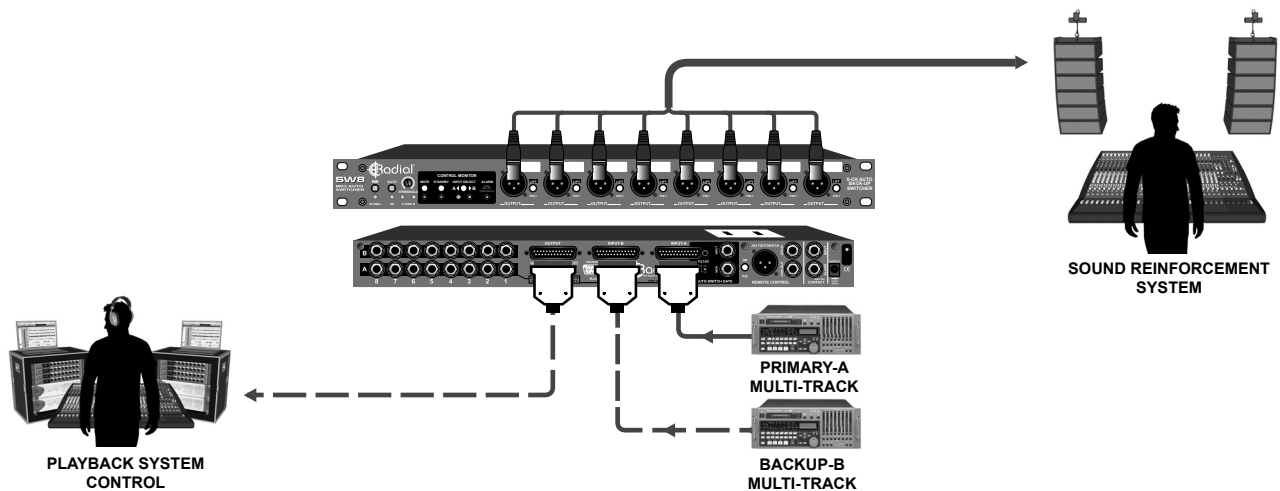
Primary and backup multi-tracks connected to the TRS inputs.

Primary and backup multi-tracks connected to the D-Sub inputs.

Audio Outputs

The SW8 is equipped with both a 25-pin D-Sub output on the rear panel and eight XLR-male outputs on the front panel. The D-Sub is a balanced 8-channel output that is coupled directly to the input relays while each XLR output is configured like a passive direct box with an isolation transformer, a -20dB PAD and a ground lift switch. An internal jumper cable can be reconfigured so that the transformer isolated DI outputs may be routed to the 25 pin D-Sub output. Most playback system technicians employ the direct D-Sub output to feed their personal playback system for pre-fader-listening, cueing and monitoring while using the isolated XLR outputs to connect to the PA. As the PA system's mixing console is often far removed, transformer isolating these outputs helps eliminate hum and buzz caused by ground loops.
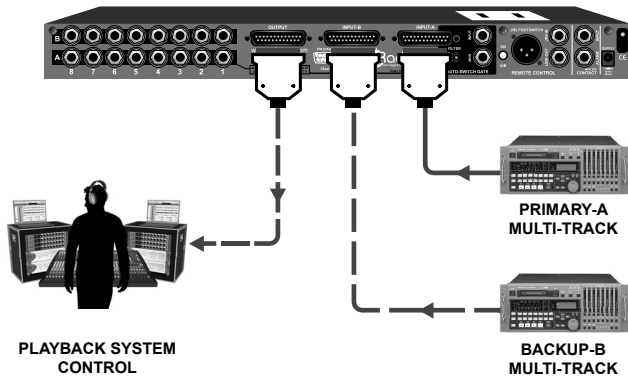
Front XLR outputs connect to PA system. Rear D-Sub output connected to local monitoring station.

MAKING CONNECTIONS

As with all audio equipment, ensure system levels are turned off before making any connections. This will help avoid turn-on or plug-in transients that could damage more sensitive components such as tweeters. There is no power switch on the SW8. As soon as you connect the power supply, it will turn on and one of the LED's below the AB select switch will illuminate to let you know power is on. To prevent accidental disconnect, there is a cable lock next to the power input jack that is used to loop-through the power cable.
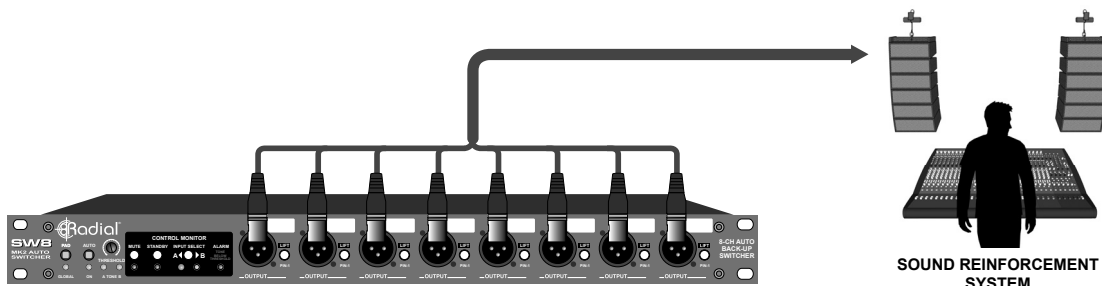
Connect your two playback machines to the SW8 inputs and send the output to your monitor system using the rear panel D-Sub. **Before you hit play...** set the SW8 in 'start-up mode' as follows:

FUNCTION - FRONT	STATUS	LED
PAD	OFF	OFF
AUTO	OFF	OFF
THRESHOLD	12 O'CLOCK	OFF
MUTE	OFF	OFF
STANDBY	OFF	OFF
AB SELECT	A	ON
LIFT (X8)	OFF	
FUNCTION - REAR	STATUS	POSITION
ALT CHANNEL 1/8	CHANNEL 1	OUT
FILTER	OFF	CENTER
JR2-ON	OFF	OUT
FUNCTION - TOP	STATUS	TOWARDS
REMOTE LINK	SW8-MK2	FRONT
STANDBY	LOCAL	BACK

PRIMARY-A MULTI-TRACK

PLAYBACK SYSTEM CONTROL

BACKUP-B MULTI-TRACK

Always test at a low volume as this will reduce possible damage due to improper connections. Turn on both playback systems and try switching between inputs A and B by depressing the front panel AB select switch.

If all is well, connect the XLR-male outputs from the front panel to your main PA mixer. These outputs are isolated to help eliminate the hum and buzz that often find their way into audio systems. If you encounter noise, try lifting the ground by depressing the lift switch adjacent to each output. In the event that you hear distortion, check to make sure your signal levels are not overloading the input on your console by adjusting the preamp trim. If the problem persists, simply depress the global PAD on the SW8 and the input sensitivity going to the transformer isolated XLR outputs will be reduced by -20dB. The PAD switch is recessed to prevent being accidentally depressed during a live show.
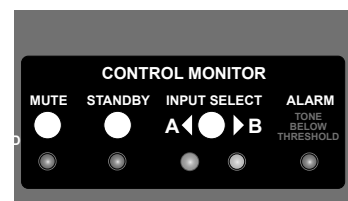
SOUND REINFORCEMENT SYSTEM

Front panel XLR outputs feed the main PA system.

Using the mute switch

The SW8 is equipped with a mute function that turns off the XLR outputs on the front panel. This innovative feature enables the playback technician to mute the outputs going to the PA while leaving the D-Sub output unaffected. This lets you cue up tracks or make level adjustments 'on the fly' without disturbing what may be happening in the main PA system.
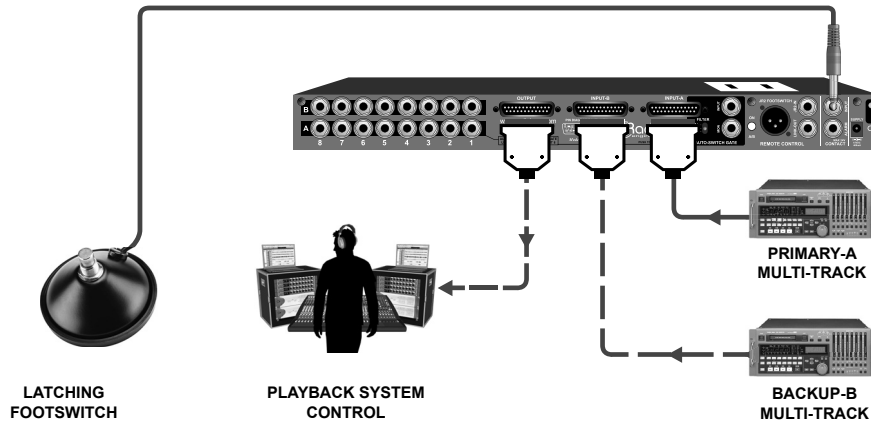
To use the mute function, depress the MUTE switch on the front panel. An LED indicator illuminates when the function is active to alert you the XLR outputs are muted. Depress the MUTE switch again to turn the function off and restore playback through the XLR outputs.

CONTROL MONITOR

MUTE   STANDBY   INPUT SELECT   ALARM
TONE BELOW THRESHOLD
A ◀ ● ▶ B

SWITCHING THE SW8 VIA A REMOTE

It is sometimes preferable to have the playback recorders and SW8 located in a secondary rack off to the side. A common example would be a keyboard player that is also managing the playback system. To address these situations, the SW8 may be remotely switched using a common latching footswitch.

The rear panel is equipped with a ¼" CONTACT INPUT jack that will cause the SW8 to switch by merely shorting the tip of the ¼" connector to ground. Switching can be performed using a typical guitar amp latching footswitch such as the type used to switch channels or turn on a reverb. You can also cause the SW8 to change inputs using a simple toggle switch or by connecting a contact closure from a MIDI system.
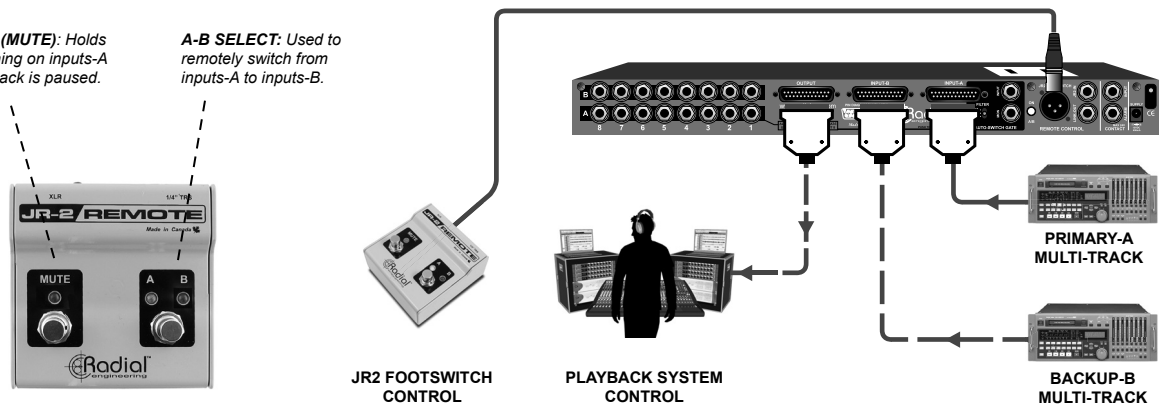
LATCHING
FOOTSWITCH

PLAYBACK SYSTEM
CONTROL

PRIMARY-A
MULTI-TRACK

BACKUP-B
MULTI-TRACK

Using the JR2 Remote

The optional Radial JR2 is a compact footswitch that is equipped with two foot-activated switches, accompanying LED indicators and choice of XLR or ¼" TRS output connectors. This multipurpose footswitch is unique in that it derives its power from the device that is connected – which in this case is the SW8. The right footswitch is labelled A/B and the left hand switch is labeled mute. When used with the SW8, the A/B footswitch switches the SW8 between A and B inputs. The JR2 mute switch actually sets the SW8 into standby mode which is discussed later in this manual. Simply plug the JR2 into the SW8 using a standard XLR mic cable and turn on the JR2 function by depressing the ON A/B switch. Test by depressing the right hand A-B footswitch. The LED indicators will follow to let you know the status.
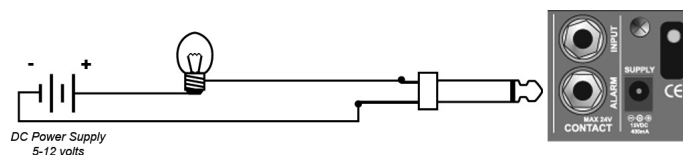
STANDBY (MUTE): Holds auto-switching on inputs-A while playback is paused.

A-B SELECT: Used to remotely switch from inputs-A to inputs-B.

JR2 FOOTSWITCH
CONTROL

PLAYBACK SYSTEM
CONTROL

PRIMARY-A
MULTI-TRACK

BACKUP-B
MULTI-TRACK

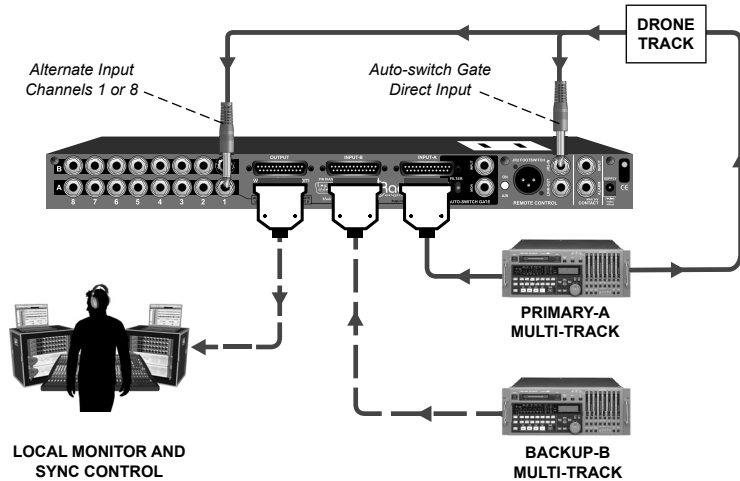**Using the 24V alarm output**

In certain situations, creating some sort of visual or audible alarm may be needed. For instance, lighting a beacon or sounding a buzzer can notify the audio engineer of a problem. Another example may be when using the SW8 as part of an evacuation system to sound an alarm. The SW8 is equipped with a special 24 volt relay that is designed for this purpose. The relay is connected to an external circuit and power supply using a standard ¼" jack on the rear panel as illustrated below..

DC Power Supply
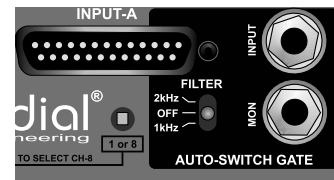5-12 volts

Normally, the relay is in an 'open' state preventing current from flowing through the external circuit. If the drone signal feeding the AUTO-GATE input falls below the set THRESHOLD level, the relay closes allowing current to flow through the external alarm circuit and the front panel ALARM LED illuminates. When the drone track is restored the relay opens and the alarm turns off.

AUTO-SWITCHING

To use the SW8 in the auto-switch mode, record a drone track (steady state tone) onto your primary playback recorder. This channel is then connected to the SW8's gate input where the signal is detected. If the drone signal 'drops out' the SW8 will divert the 8 inputs from primary-A playback system to the backup-B system using a series of relays. A pure 1kHz tone is recommended but any steady state tone will work for the drone track. You merely need to adjust the threshold to match the level. You can monitor the drone track using the gate monitor out. This can also be used to loop through for other units should you wish to have several units switch concurrently via a 'drone and gate' setup.

Threshold control sets the sensitivity of the auto-switch detector

Connect the drone track to channels 1 or 8 using the D-Sub or ¼" inputs or connect direct to the gate input.

In fact you can even use or SMPTE time code as an audio source. Digital square wave carrier signals can be smoothed out using the 3-position filter on the rear panel to have it 'look' more like a sine wave. Simply test using the various filter and threshold settings to find the one that produces stable results.
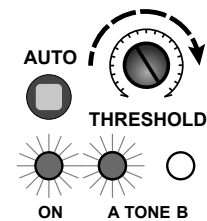
Auto-switch gate input

The auto-switch gate that controls automatic switching is arranged so that it can be fed from three different source inputs:

1. **Channel-1, Input-A:** Diverts to the auto-gate input automatically unless a cable is connected to the gate input. Make sure the 1/8 ALT switch is in the out position to connect channel-1 to the auto-switch gate.

2. **Channel-8, Input-A:** Many techs prefer to record the drone on channel-8 as it leaves 1 free as a primary playback channel. Simply depress the ALT 1/8 switch inward to route channel-8 to the auto-switch gate.

3. **Direct to gate:** You can also patch a signal directly to the auto-switch gate by connecting to the gate input. This defeats the channel-1/8 routing option, leaving these channels free for more playback channels.

   The ¼" gate input features a switching jack that defeats the channels 1 or 8 routing when a plug is inserted. In other words, channels 1 or 8 are routed to the gate input unless a plug is inserted into the ¼" gate input.

Using the auto-switch function

Turn auto-switching on by depressing the front panel AUTO switch inward. An LED illuminates to alert you the auto-switch mode is active. This will disengage the A/B select switch on the front panel along with the remote JR2 and contact closure switching functions. Rotate the THRESHOLD level control fully counter-clockwise. Start your primary (A) machine with the drone track. The SW8's LED below the A/B switch will indicate signal is present. Adjust the threshold clockwise until the SW8 switches from B to A. To test, pause the A playback system and the SW8 will switch to B. Activate your B playback rig to audition the two sources as you switch back and forth using the threshold control.
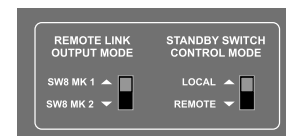
Set the THRESHOLD control to 7 o'clock and turn clockwise until the SW8 switches to the inputs-A.

Using the standby function

One of the cool new features on the SW8 is the addition of a STANDBY switch. This is used to arm the SW8 so that it is not searching for a drone signal when one may not be present. For instance, consider a situation where a song finishes, and the artist decides to talk to the audience between songs. The playback technician immediately reaches over and stops the main playback unit which in turn will shut off the drone signal. This in turn will cause the SW8 to switch to the B backup playback system as it assumes that there is a system fault. The standby switch enables the playback technician to pause playback and hold the SW8 on it's primary 'A' inputs as he awaits the count-in for the next song. As soon as the song begins, he starts the backing tracks to follow the band. He can then leisurely revert back to auto-mode by turning the standby switch off allowing the SW8 to monitor the drone signal.
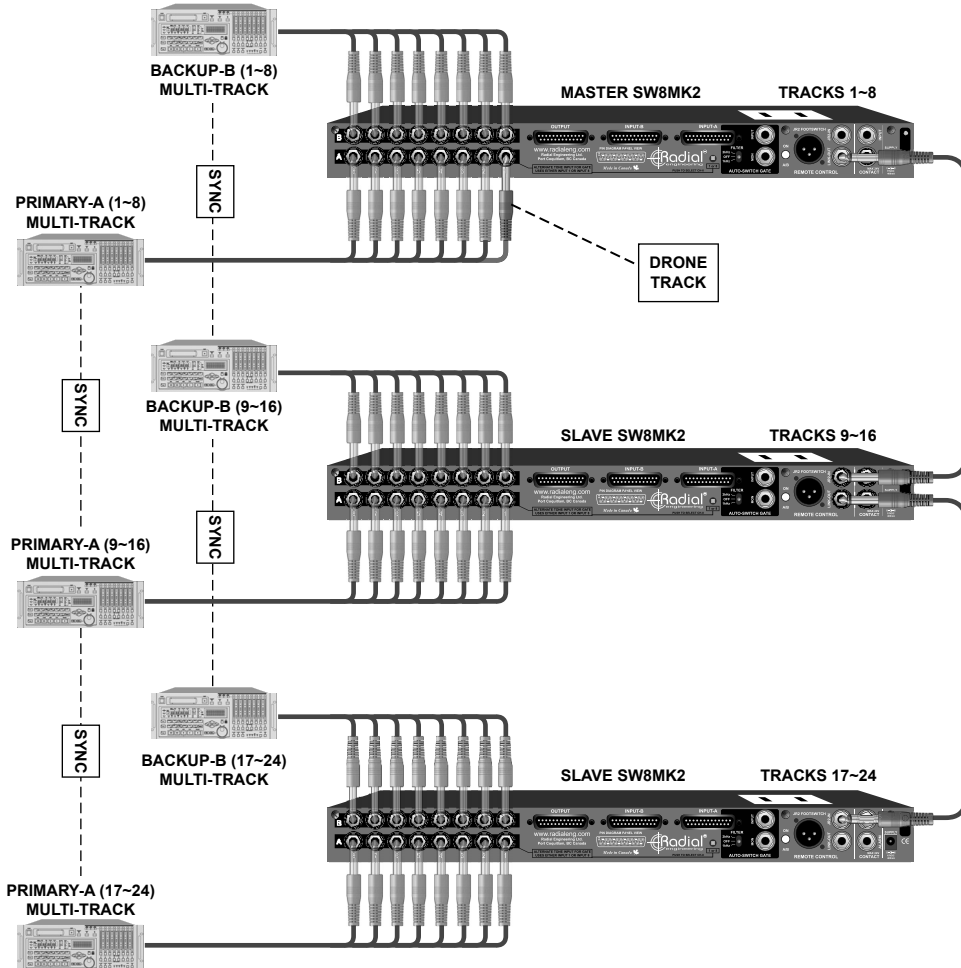
The standby mode can be activated in two ways, via the front panel STANDBY switch or by remote control via the optional JR2 footswitch. The standby control mode switch on the top cover allows you to choose LOCAL control via the front panel switch or REMOTE control.
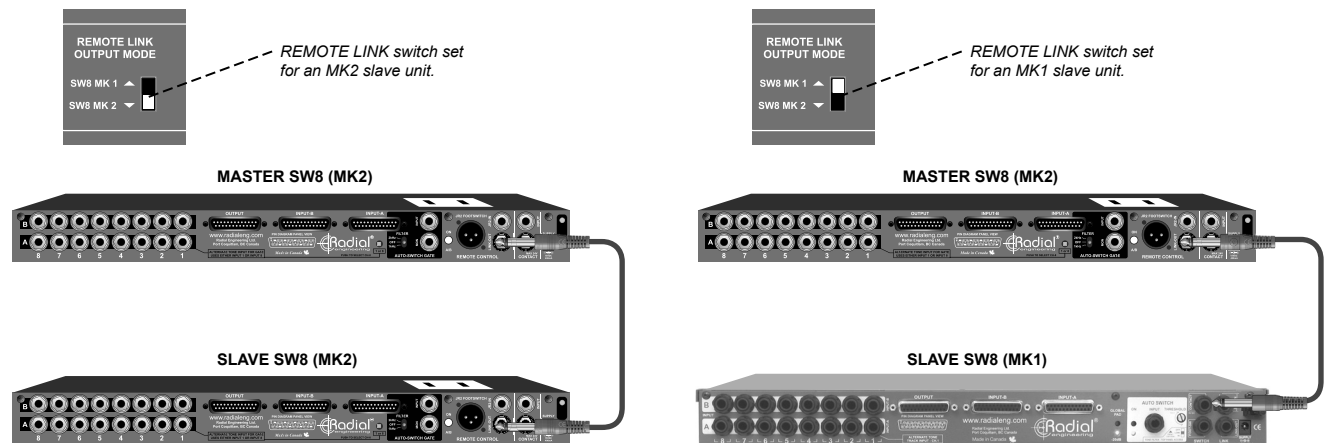
Use the STANDBY CONTROL MODE switch to choose between local or remote control.

LINKING MULTIPLE SW8 SWITCHERS TOGETHER

For larger playback rigs, the SW8 may be configured in a master-slave configuration whereby two link connectors are used to tie multiple SW8's together. Once connected these jacks relay front panel A/B switching and provide the same remote control capabilities as the optional JR2 footswitch. For instance, one footswitch connected to the master can control multiple SW8's and in doing so, also sends the 'standby' command to the slave units. This lets you build 16, 24, 32 or even 64 channel playback rigs and have all audio channels switch from A to B at the same time. To set up a link, make sure the REMOTE LINK mode switch on the top panel is set accordingly (see below). Connect a standard ¼" TRS cable from the master SW8 JR2 LINK-OUT to the slave's ¼" TRS JR2 LINK-IN connectors. For larger systems, continue the chain from the first slave to the second and so on.
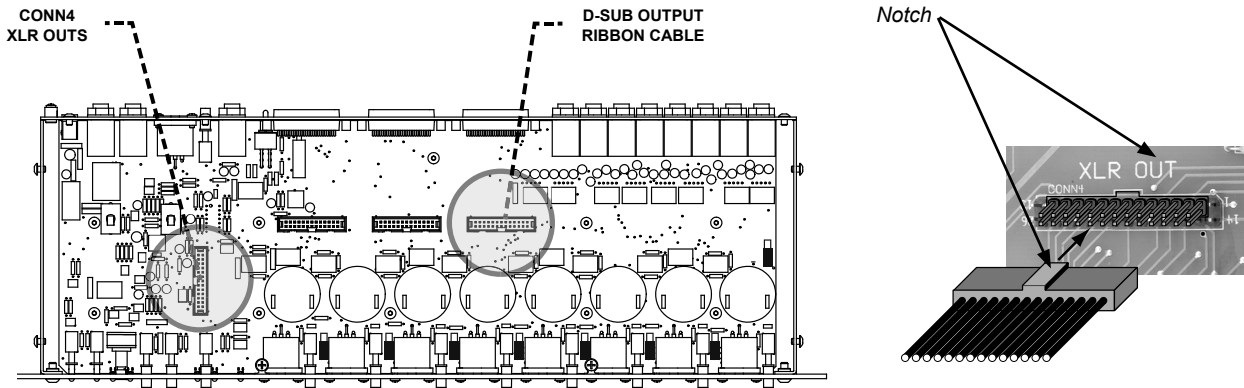

When combining two SW8 MK2 (second generation) units together, make sure the LINK-MODE switch on the top panel is set to the SW8 MK2 position. When combining your second generation SW8 MK2 with a first generation SW8 MK1, the switch needs to be set to the SW8 MK1 position. This ensures that both units switch in proper sync.
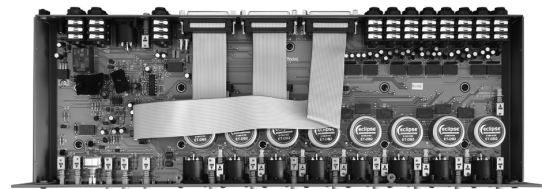
RECONFIGURING THE ISOLATED OUTPUTS WITH THE INTERNAL RIBBON CONNECTOR

An internal ribbon cable allows the SW8 to be reconfigured so that the eight transformer isolated mic-level outputs appear on the rear panel 25 pin D-Sub connector. This allows mic-level connections to be made at the rear panel instead of the front XLR jacks. The -20dB PAD, the LIFT switches and the front panel XLR outputs will continue to function as normal.

To reconfigure the internal ribbon cable, remove the top panel and locate the D-Sub output ribbon cable. Gently remove the ribbon connector from the circuit board and plug it into CONN4 XLR OUT on the circuit board as shown below. The red stripe on the ribbon cable should be on the same side as the rear panel and the notch on the connector should match with the notch silk screened on the circuit board.

CONN4
XLR OUTS

D-SUB OUTPUT
RIBBON CABLE

Notch

XLR OUT

Shown in the default configuration with a direct line-level D-Sub output.

Shown in the alternate configuration with an isolated mic-level D-Sub output

INTERNAL CHASSIS GROUND LIFT

All connectors are 100% isolated, allowing chassis and signal grounds to be kept separate. However, an internal switch for each channel is provided to connect the pin-1 cable shields to the chassis without modifying the SW8. By default, this switch is factory set to open or 'lifted' allowing the chassis to 'float' ungrounded. Should a specific grounding scheme require the cable shields to be bonded to the chassis, remove the top cover and set the eight switches to the closed (pushed in) position. The switch may be accessed by removing the top cover.

CHASSIS
GROUND 8

CHASSIS
GROUND 1-7

BLOCK DIAGRAM

SPECIFICATIONS

Input-A & B
1/4" phone: ....TRS balanced +4dB / -10dB
D-Sub: ....DB25 balanced +4dB / -10dB
Input impedance: ....140K ohms typical (without Global PAD)
                         10k ohms typical (with Global PAD)

Direct Output
Type:............................Passive balanced signal path
Switching Time: ....3ms maximum @ 20°C

XLR Output
Frequency response:...20Hz to 20kHz +/- 2.5dB
THD: ....0.01 % from 20Hz to 20kHz
Output impedance: ......600 ohms
Output:.........................-50dB (mic level) balanced (pin-2 hot)
PAD: ....-20dB (Global - all channels)

Foot-SW
1/4" phone: ....Contact closure to ground

Contact Relay
1/4" phone: ....5-24 VDC relay circuit

Dimensions:.................19" x 6.5" x 1.75" (1RU)
                         482.6mm x 165.1mm x 44.45mm
Weight: ....7.2 lbs. (3.26 kg.)
Power supply:..............Output 15 VDC @ 400 mA

FEMALE DB-25 PIN-OUT (PANEL VIEW)

MALE DB-25 PIN-OUT (CABLE VIEW)

! *American standard SAE lock-down screws.*

XLR OUTPUTS

Ground   Positive (+)

Negative (−)

¼" TRS INPUTS

Negative (−)

Ground   Positive (+)

RADIAL ENGINEERING LTD.
3 YEAR TRANSFERABLE LIMITED WARRANTY

RADIAL ENGINEERING LTD. ("Radial") warrants this product to be free from defects in material and workmanship and will remedy any such defects free of charge according to the terms of this warranty. Radial will repair or replace (at its option) any defective component(s) of this product (excluding finish and wear and tear on components under normal use) for a period of three (3) years from the original date of purchase. In the event that a particular product is no longer available, Radial reserves the right to replace the product with a similar product of equal or greater value. In the unlikely event that a defect is uncovered, please call 604-942-1001 or email service@radialeng.com to obtain an RA number (Return Authorization number) before the 3 year warranty period expires. The product must be returned prepaid in the original shipping container (or equivalent) to Radial or to an authorized Radial repair center and you must assume the risk of loss or damage. A copy of the original invoice showing date of purchase and the dealer name must accompany any request for work to be performed under this limited and transferable warranty. This warranty shall not apply if the product has been damaged due to abuse, misuse, misapplication, accident or as a result of service or modification by any other than an authorized Radial repair center.

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