



SM26S

SPLITTER / MIXER

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22369



IMPORTANT SAFETY INSTRUCTIONS



1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with manufacturer's instructions.
8. Do not install near any heat sources such as radiators, registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord and plug from being walked on or pinched particularly at plugs, convenience receptacles, and the point where it exits from the apparatus.
11. Only use attachments and accessories specified by Rane.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. The plug on the power cord is the AC mains disconnect device and must remain readily operable. To completely disconnect this apparatus from the AC mains, disconnect the power supply cord plug from the AC receptacle.
16. This apparatus shall be connected to a mains socket outlet with a protective earthing connection.
17. When permanently connected, an all-pole mains switch with a contact separation of at least 3 mm in each pole shall be incorporated in the electrical installation of the building.
18. If rackmounting, provide adequate ventilation. Equipment may be located above or below this apparatus, but some equipment (like large power amplifiers) may cause an unacceptable amount of hum or may generate too much heat and degrade the performance of this apparatus.
19. This apparatus may be installed in an industry standard equipment rack. Use screws through all mounting holes to provide the best support.

WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. Apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.

WARNING



To reduce the risk of electrical shock, do not open the unit. No user serviceable parts inside. Refer servicing to qualified service personnel.

The symbols shown below are internationally accepted symbols that warn of potential hazards with electrical products.



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



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

WARNING: This product may contain chemicals known to the State of California to cause cancer, or birth defects or other reproductive harm.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION: Changes or modifications not expressly approved by Rane Corporation could void the user's authority to operate the equipment.

INSTRUCTIONS DE SÉCURITÉ



1. Lisez ces instructions.
2. Gardez précieusement ces instructions.
3. Respectez les avertissements.
4. Suivez toutes les instructions.
5. Ne pas utiliser près d'une source d'eau.
6. Ne nettoyer qu'avec un chiffon doux.
7. N'obstruer aucune évacuation d'air. Effectuez l'installation en suivant les instructions du fabricant.
8. Ne pas disposer près d'une source de chaleur, c-à-d tout appareil produisant de la chaleur sans exception.
9. Ne pas modifier le cordon d'alimentation. Un cordon polarisé possède 2 lames, l'une plus large que l'autre. Un cordon avec tresse de masse possède 2 lames plus une 3^e pour la terre. La lame large ou la tresse de masse assurent votre sécurité. Si le cordon fourni ne correspond pas à votre prise, contactez votre électricien.
10. Faites en sorte que le cordon ne soit pas piétiné, ni au niveau du fil, ni au niveau de ses broches, ni au niveau des connecteurs de vos appareils.
11. N'utilisez que des accessoires recommandés par Rane.
12. N'utilisez que les éléments de transport, stands, pieds ou tables spécifiés par le fabricant ou vendu avec l'appareil. Quand vous utilisez une valise de transport, prenez soin de vous déplacer avec cet équipement avec prudence afin d'éviter tout risque de blessure.
13. Débranchez cet appareil pendant un orage ou si vous ne l'utilisez pas pendant un certain temps.
14. Adressez-vous à du personnel qualifié pour tout service après vente. Celui-ci est nécessaire dans n'importe quel cas où l'appareil est abîmé : si le cordon ou les fiches sont endommagés, si du liquide a été renversé ou si des objets sont tombés sur l'appareil, si celui-ci a été exposé à la pluie ou l'humidité, s'il ne fonctionne pas correctement ou est tombé.
15. La fiche du cordon d'alimentation sert à brancher le courant alternatif AC et doit absolument rester accessible. Pour déconnecter totalement l'appareil du secteur, débranchez le câble d'alimentation de la prise secteur.
16. Cet appareil doit être branché à une prise terre avec protection.
17. Quand il est branché de manière permanente, un disjoncteur tripolaire normalisé doit être incorporé dans l'installation électrique de l'immeuble.
18. En cas de montage en rack, laissez un espace suffisant pour la ventilation. Vous pouvez disposer d'autres appareils au-dessus ou en-dessous de celui-ci, mais certains (tels que des gros amplificateurs) peuvent provoquer un buzz ou générer trop de chaleur au risque d'endommager votre appareil et dégrader ses performances.
19. Cet appareil peut-être installé dans une baie standard ou un chassis normalisé pour un montage en rack. Visser chaque trou de chaque oreille de rack pour une meilleure fixation et sécurité.

ATTENTION: afin d'éviter tout risque de feu ou de choc électrique, gardez cet appareil éloigné de toute source d'humidité et d'éclaboussures quelles qu'elles soient. L'appareil doit également être éloigné de tout objet possédant du liquide (boisson en bouteilles, vases,...).

ATTENTION



Afin d'éviter tout risque de choc électrique, ne pas ouvrir l'appareil. Aucune pièce ne peut être changée par l'utilisateur. Contactez un SAV qualifié pour toute intervention.

Les symboles ci-dessous sont reconnus internationalement comme prévenant tout risque électrique.



Ce symbole indique que cette unité utilise un voltage élevé constituant un risque de choc électrique.



Ce symbole indique la présence d'instructions d'utilisation et de maintenance importantes dans le document fourni.

REMARQUE: Cet équipement a été testé et approuvé conforme aux limites pour un appareil numérique de classe B, conformément au chapitre 15 des règles de la FCC. Ces limites sont établis pour fournir une protection raisonnable contre tout risque d'interférences et peuvent provoquer une énergie de radiofréquence s'il n'est pas installé et utilisé conformément aux instructions, peut également provoquer des interférences aux niveaux des équipements de communication. Cependant, il n'existe aucune garantie que de telles interférences ne se produiront pas dans une installation particulière. Si cet équipement provoque des interférences en réception radio ou télévision, ceci peut être détecté en mettant l'équipement sous/hors tension, l'utilisateur est encouragé à essayer de corriger cette interférence par une ou plusieurs des mesures suivantes:

- Réorienter ou déplacer l'antenne de réception.
- Augmenter la distance entre l'équipement et le récepteur.
- Connecter l'équipement à une sortie sur un circuit différent de celui sur lequel le récepteur est branché.
- Consulter un revendeur ou un technicien radio / TV expérimenté.

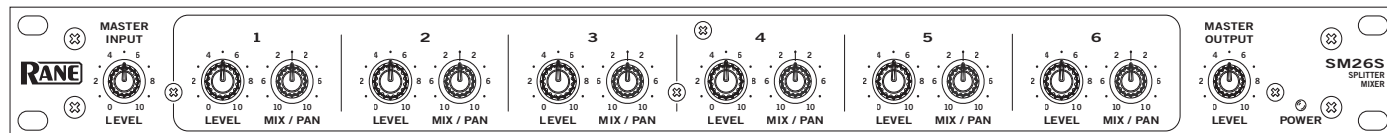
ATTENTION: Les changements ou modifications non expressément approuvés par Rane Corporation peuvent annuler l'autorité de l'utilisateur à manipuler cet équipement et rendre ainsi nulles toutes les conditions de garantie.

CAN ICES-3 (B)/NMB-3(B)



Cartons et papier à recycler.

RANE



Quick Start

Realizing that in most areas there are laws against reading owners manuals, and that reading them under the blankets at night with a flashlight makes you feel stupid, we therefore provide this brief, yet legal description of how to use the SM26S just in case your batteries are low and your mother is about to come in the room.

To achieve a quick understanding of the SM26S, think of it as a six channel mixer with faders and pans only. Or think of it as a 2-to-6 channel splitter with output level controls and a mix knob (to control how much of which input goes to which output). If you get that, you may stop here as long as you know what a TRS plug is.

As a six channel mixer, **MONO INPUT 1** through **6** may be placed on the Right or Left bus or both, in any amount. The respective **LEVEL** controls on the front serve as the mixer's faders, the adjacent **PAN** controls place the channel's signal into the stereo field. As an effects mixer or line level expander for a larger mixer, set up the **LEVELS** then adjust the **PANS**. The **MASTER OUTPUT LEVEL** adjusts the overall level of the mix at the Master Outputs.

As a splitter, place one or both input signals into the **LEFT** and/or **RIGHT MASTER INs**. Select the Input(s) to be placed at each of the six **MONO OUTPUTS** by rotating the **MIX / PAN** control to the proper position. Set the individual channel **LEVEL** controls for proper output level. The **MASTER INPUT LEVEL** control adjusts both Right and Left Input signal levels together.

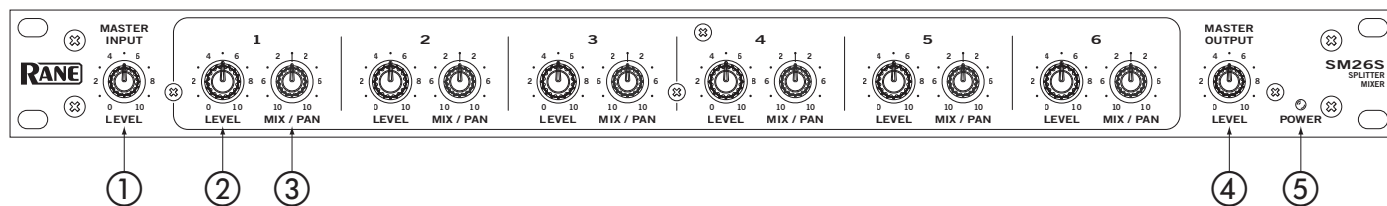
SM26S Connection

When connecting the SM26S to other components in your system for the first time, *leave the power cord for last*. This gives you a chance to make mistakes and correct them before damage is done to anything fragile.

As you have no doubt noticed, all Inputs and Outputs on the SM26S's rear panel are 1/4" connectors. The Inputs and Outputs are active balanced on Tip-Ring-Sleeve (TRS) jacks which allow the flexibility of connecting in either a balanced or unbalanced fashion. If unbalanced operation is your preference, the simplest way to accomplish this is through the use of tip-sleeve 1/4" connectors. The ring is not essential unless balanced operation is required. Be aware that if you are running unbalanced and using TRS connectors with both tip and ring, the ring and sleeve must be shorted together. Failure to do so on the inputs results in a gain loss of 6 dB.

Balanced operation requires that TRS plugs be used. The tip is hot (+), the ring is return (-) and the sleeve is ground. Rane-Note, "Sound System Interconnection" (included here) contains some great pictures to aid your interconnect ventures.

Front Panel Description



① **MASTER INPUT LEVEL** sets the gain of the Left & Right Master Input stages, with a range of Off to +12 dB. In the splitting mode, this controls the Level of all Mono channel Outputs at once (i.e., those which do not have a separate input).

② **Mono Input LEVEL** controls the Level of signal through each particular channel. When fed from the MONO INPUT jack, each stage has a gain range from Off to +12 dB minimum, allowing level matching of -10 dBV equipment to +4 dBu gear. When fed via the LEFT & RIGHT MASTER IN, these LEVEL controls automatically limit to a maximum of unity gain to accommodate the +12 dB available from the Left & Right Input gain stages.

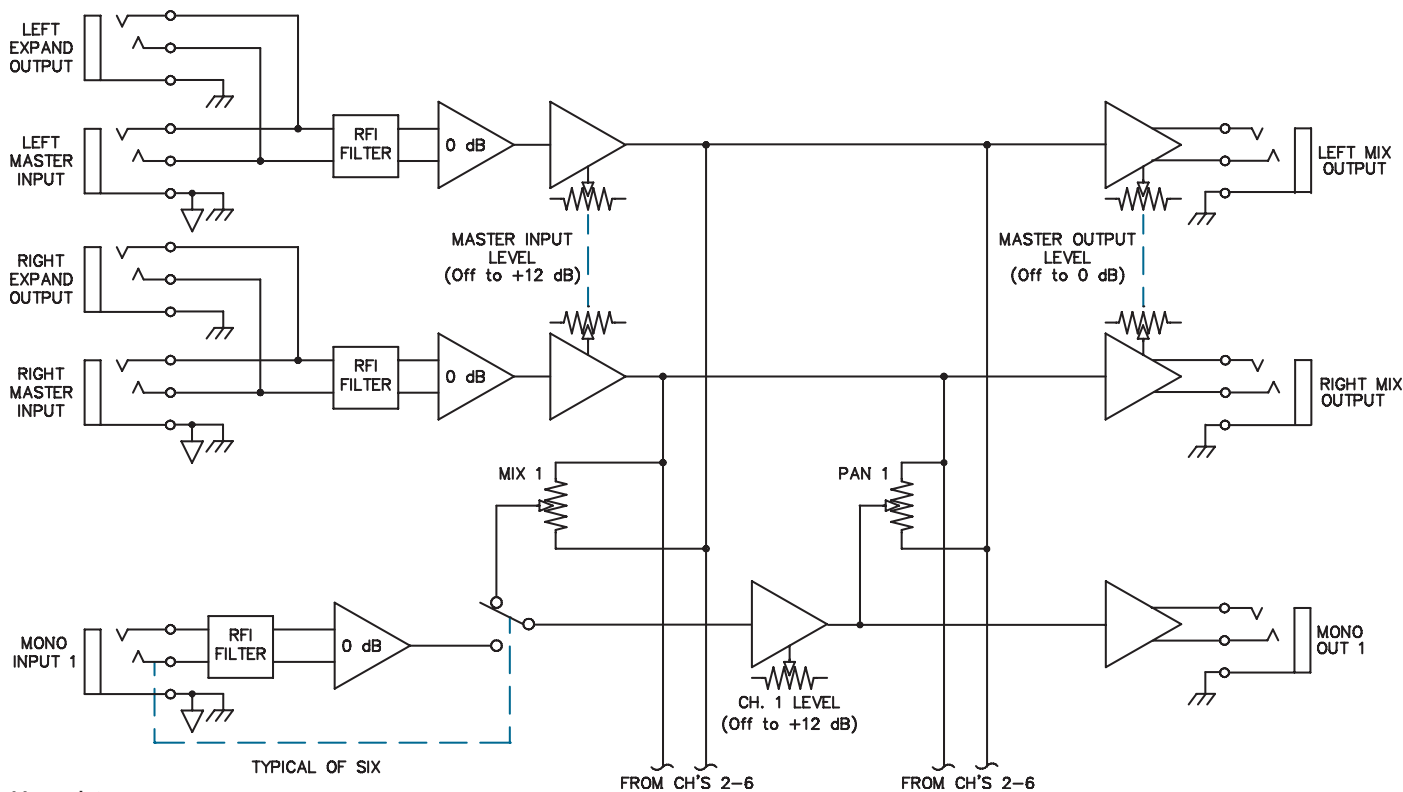
③ **MIX / PAN** serves two different functions:

MIX: When used as a SPLITTER, this controls the mix of Left and Right Master Input program to each channel's MONO OUT.

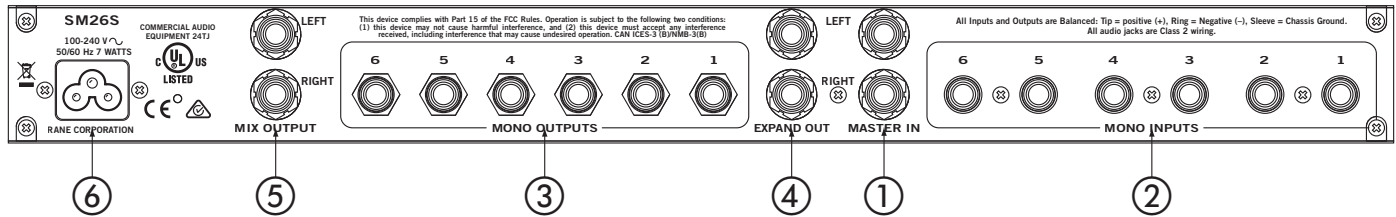
PAN: When used as a MIXER, this control pans the Mono channel Input between the LEFT and RIGHT MIX OUTPUTS.

④ **MASTER OUTPUT LEVEL** controls the gain of the output stages and the amount of signal at the MIX OUTPUT jacks. It does not affect the level of any of the six MONO OUTPUTs. This allows an increase in headroom to eliminate overloading due to excessive combined signal from one or more Inputs. Range of gain is from Off to 0 dB (unity). Refer to the block diagram below.

⑤ **POWER indicator:** When this yellow LED is *lit*, the SM26S is ready to go (when it's off, it's not).



Rear Panel Description



- ① **MASTER IN** are balanced Tip-Ring-Sleeve (TRS) ¼" Master Inputs. These Inputs feed all six MONO OUTs when all MONO INs are not used. Connecting to individual MONO INs disconnects that channel from these Inputs (refer to the Block Diagram). For unbalanced operation use a standard mono ¼" plug; for balanced operation use a TRS (stereo) ¼" plug wired as follows:
TIP is signal + (connect to Pin 2 on a 3-pin connector).
RING is signal – (pin 3 in a 3-pin connector).
SLEEVE is chassis ground.
 - ② **MONO INPUTS** are TRS ¼" jacks which accept either balanced or unbalanced mono signals. These are switching jacks which automatically bypass the MASTER IN jacks whenever a plug is inserted (see the Block Diagram). Same wiring conventions as in ① above.
 - ③ **MONO OUTPUTS** are ¼" TRS jacks that deliver either an unbalanced output (use TS plugs), or a balanced output (use TRS plugs). Follow wiring conventions as in ① above.
 - ④ **EXPAND OUTS** are ¼" TRS jacks connected in parallel with the MASTER IN jacks, allowing two or more SM26Ss to be daisy chained for multiple splitting. Simply connect the EXPAND OUT to the MASTER IN of another SM26S; there is no limit to the number of expansions possible with the SM26S.
- NOTE: These Expand Outputs are *not* buffered from the Master Inputs. Therefore it is not possible to mix both balanced and unbalanced lines in the same channel between several units: once the ring and sleeve are shorted anywhere in the chain (by using a mono plug) the entire line becomes unbalanced.
- ⑤ **MIX OUTPUTS** are balanced TRS ¼" outputs controlled by the MASTER OUTPUT LEVEL control. They are fed either by the MASTER IN or by any of the six MONO INPUTS, or a combination of both (see *The Swiss Army Mixer* RaneNote). Follow wiring conventions as in ① above.
 - ⑥ **Universal Voltage Input:** via a miniature IEC 60320 C6 appliance inlet. This mates with an IEC 60320 C5 line cord (USA domestic). Do **not** lift the ground connection!

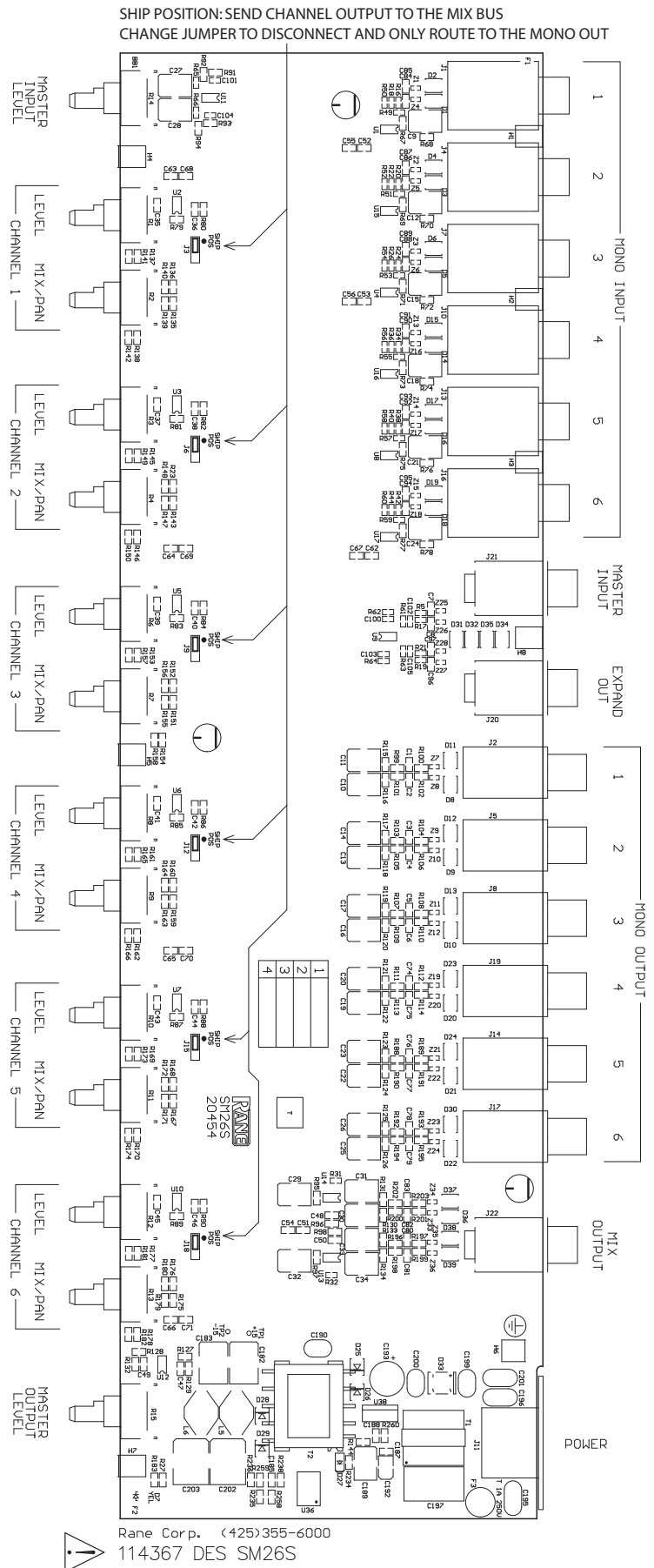
Operating Instructions

Since numerous applications exist for the SM26S, no single set of operational procedures control its use. *The SM26S Swiss Army Mixer* RaneNote (included) explores the many configurations of the SM26S in depth, and you should peruse it for applications information.

Internal Jumper Options

There exist within the SM26S some signal routing options, requiring removal of the top cover to move some jumpers. This must only be done with the power off by qualified service personnel.

If an SM26S needs to have an additional set of independent outputs, as in a 2x4 stereo distribution amplifier (see *Swiss Army Mixer*, Figure 10), the LEFT and RIGHT MIX OUTPUTS can be used in addition to the 6 MONO OUTS. Normally, the LEFT and RIGHT MIX OUTPUTS produce the sum mix of all 6 LEVEL and PAN controls. To break any channel away from the Mix Output bus, internal jumpers have been provided. These are located behind the MIX/PAN controls for each channel. J3 connects MONO OUT 1 to the mix bus. J6 connects MONO OUT 2, J9 connects MONO OUT 3, and so on — see the board layout.





General Description

The Rane Model SM26S Splitter Mixer is one of the most useful, yet unusual audio products available. In its most basic configuration, it is a six-to-two line level mixer. It will accept six balanced or unbalanced line level inputs which are applied to six Level and Pan controls. An additional stereo Master Input allows a total of eight inputs. The result of the mix is sent to an overall Master Output Level control and appears at the Left and Right Outputs on the rear. In its splitter mode, the SM26S can take one or two line level inputs and split these to any of the six Mono Outputs on the rear. The Mix/Pan controls in this mode control the level from each of the two input buses to be applied to each Output. Internal header blocks allow the Mix Outputs to become an independent stereo out, allowing a total of eight outputs. The SM26S may also be used as a six input, six output buffer amplifier in which case signal applied to Input 1 is delivered to Output 1, and so on.

The SM26S may also be used in a combination of modes at once. For instance, Inputs 1 through 3 may be mixed to the left and/or right output buses while at the same time Outputs 4 and 5 are delivering signal originally applied to the Left and Right Master Inputs while at the same time Output 6 is being driven from Input 6 in the straight through mode.

The front of the SM26S comprises a Master Input Level control, six Channel Level controls, six Mix/Pan controls and a Master Output Level control. The rear of the SM26S provides two Master Left and Right Inputs, six Mono Inputs, six Mono Outputs and two Master Left and Right Mix Outputs. All Inputs and Outputs on the SM26S are 1/4" TRS active balanced.

See the RaneNote, *"The SM26S Swiss Army Mixer"* for additional application information, available from our website.

Features

- -10 dBV to +4 dBu Shifter
- +4 dBu to -10 dBV Shifter
- 6 Balanced Mono Inputs, 6 Balanced Mono Outputs
- 2 Main Balanced Inputs, 2 Main Balanced Outputs
- 6 Input Level Controls and 6 Mix/Pan Controls
- Master Input and Output Level Controls
- Internal Universal Power Supply (100-230 VAC)

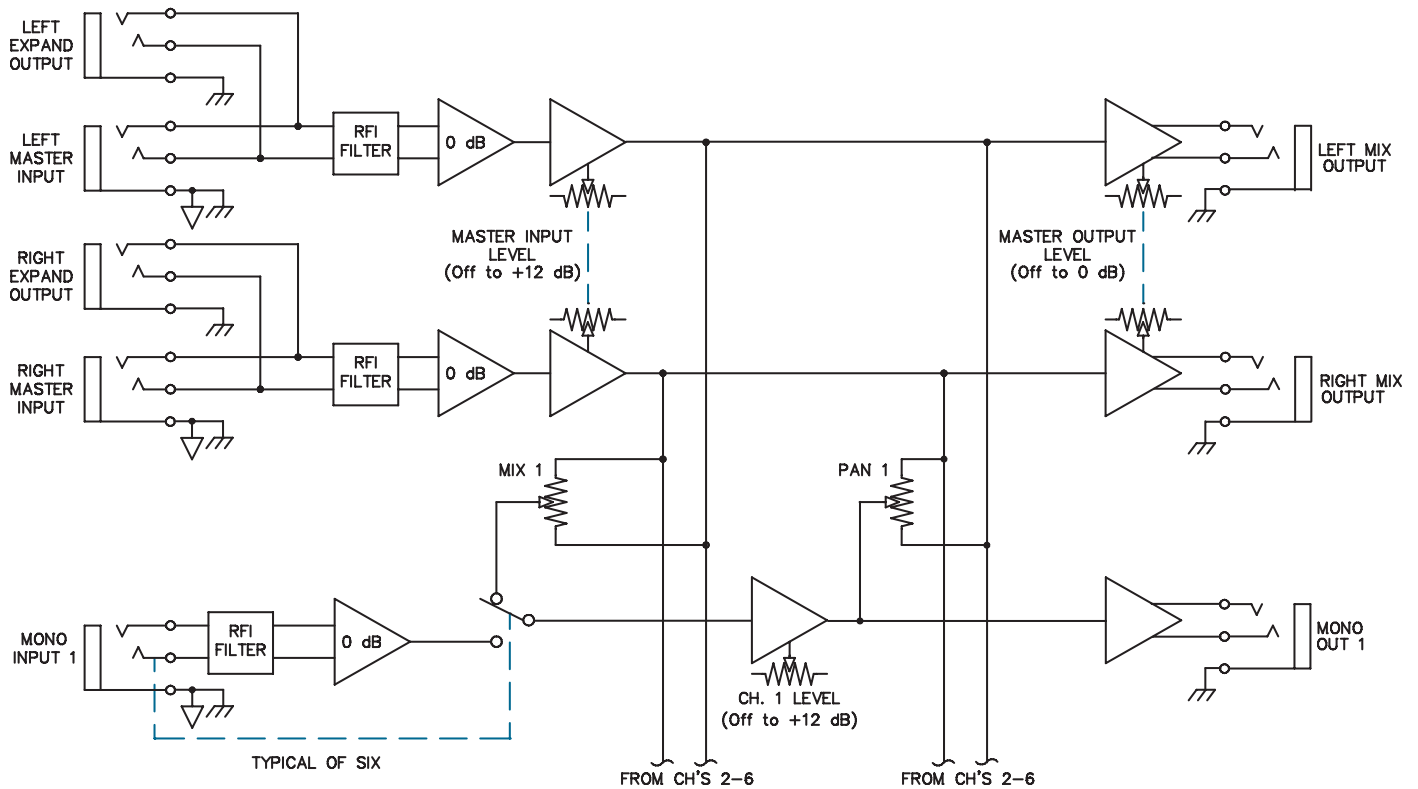
Applications

- 6 Mono Inputs, Stereo Output Line Mixer
- 4 Stereo Inputs, Stereo Output Line Mixer
- Stereo Input, 6 Mono Output Line Splitter
- 1 Stereo Input, 4 Stereo Output Splitter
- 6-In, 6-Out Booster Amplifier
- Configurable to 8 Outputs

Features and Specifications

Parameter	Specification	Limit	Units	Conditions/Comments
Inputs: Type	Active Balanced			
.....Connectors	¼" TRS			Tip=(+), Ring=(-), Sleeve=GND
.....Impedance	20k	1%	Ω	
.....Maximum Level	22	1	dBu	
Outputs: Type	Active Balanced			
.....Connectors	¼" TRS			
.....Impedance	125	typ	Ω	1 kHz
.....Maximum Level	26	1	dBu	10 kΩ or greater
Overall Gain Range	Off to +12	-0/+6	dB	Any Input to any Output
RFI Filters	Yes	5%		
Frequency Response	10-40 kHz	+0/-3	dB	
THD+Noise	0.008	.002	%	+4 dBu, 20-20 kHz unity gain
IM Distortion (SMPTE)	0.009	.002	%	60 Hz /7 kHz, 4:1, +4 dBu unity gain
Signal-to-Noise Ratio				re +4 dBu, 20 kHz noise bandwidth
	120	2	dB	Mono Outputs, unity gain
	98	2	dB	Mix Outputs, unity gain
Crosstalk				
.....L-R Panning	60 (1 kHz)	2	dB	Any Input to Mix Outs
.....Channel-Channel	75 (1 kHz)	2	dB	Any Input to Mix Outs
Mean Time Between Failure	35,500 hours		h	Mil-Hdbk-217D, Section V
Unit: Maximum Power	7		W	
.....Universal Line Voltage	100 to 240	10%	VAC	50/60 Hz
.....Conformity	CE, FCC, cULus			
.....Construction	All Steel			19" 1U Rackmount
.....Size	1.75" H x 19" W x 5.3" D			(4.4 cm x 48.3 cm x 13.5 cm)
.....Weight	5 lb			(2.3 kg)
Shipping: Size	4.25" x 20.3" x 13.75"			(11 cm x 52 cm x 35 cm)
.....Weight	9 lb			(4.1 kg)
<i>Note: 0 dBu=0.775 Vrms</i>		<i>Unity Gain = Master Levels Set to ~ "7" Position</i>		

Block Diagram



Application Information

Aptly nicknamed the “Swiss Army Mixer”, the SM26S is an extremely versatile single rack-space tool providing a number of different functions to solve a broad spectrum of line-level signal routing problems. Whether the need is for line mixing, line distribution or line matching/amplification, the SM26S easily performs these tasks, along with additional features for even more flexibility.

One of the most popular uses is line-level mixing for keyboards, drum machines, and effects. Expanding existing console limitations is simple. Whenever a mono or stereo sub-mix is desired, the SM26S comes to the rescue. Up to three stereo, or six mono sources easily mix together, with panning ability on every input. Many musical instrument performers find the SM26S indispensable for combining various effects and expanding the available loops on their signal processors.

The SM26S capabilities also include a wide variety of functions such as live recording splitting, -10 dBV to +4 dBm level matching, intercom splitting, line boosting, hotel and club zone management, restaurant paging systems, adding additional monitor buses for studio or stage use, and many more custom applications. Please consult the RaneNote “*The SM26S Swiss Army Mixer*” for in-depth applications.

The SM26S provides full expansion capabilities for all applications. Simple ¼" TRS connectors allow expansion using patch cords. Using these provisions, an unlimited number of lines may be mixed or split upon demand. For example, three units create either an 18 input mixer or an 18 output splitter, or a combination of both.

Rear Panel



Architectural Specifications

The splitter mixer unit shall have six (6) mono inputs, six (6) mono outputs, two (2) master inputs, and two (2) master outputs. The unit shall be capable of mixing or splitting any inputs to any outputs simultaneously. Each mono input shall have a level control with a range of off to +12 dB gain. Separate +12 dB gain Master Input and Output Level controls shall be provided.

Complete expansion capabilities shall be provided to allow any number of similar units to be coupled together.

A combination Mix or Pan control shall be provided on each of the six (6) mono channels to allow any output to be a mix of

the two master inputs, or to allow any mono input to be panned between the two master outputs.

The inputs and outputs shall be active balanced designs terminated with 1/4" TRS (tip-ring-sleeve) connectors. RFI filters shall be provided. Ultrasonic filters shall be built-in.

The unit shall be capable of operation by means of its own built-in universal power supply operating at 100-240 VAC and meet CE requirements (pending). The unit shall be UL and cUL listed (pending). The unit shall be entirely constructed from cold-rolled steel.

The unit shall be a Rane Corporation SM26S.

The SM26S Swiss Army Mixer

- **6 In, 2 Out Mixer**
- **2 In, 6 Out Splitter**
- **6 In, 6 Out Buffer Amplifier**
- **4 Channel Stereo Splitter**
- **Other Applications**

Introduction

Everyone needs a line level mixer. Even my mother. It has to be small, and cheap, and versatile. It has to be able to mix split, distribute, level match, amplify, attenuate and pan—all without adding any distortion or noise whatsoever. The mind reels...

And recovers, and discovers the Rane SM26S Splitter Mixer. It is small (1 rack space), extremely versatile, and affordable. It is a 6 in / 2 out mixer, a 2 in / 6 out splitter/distribution amplifier, and a 6 in / 6 out buffer amplifier. It has 12 dB of gain and better than 80 dB of attenuation. The distortion products are less than .008% and the noise floor is a trifle 35 microvolts.

Inside this RaneNote is found a gruelingly complete description of the innards of an SM26S and a pathetically skimpy introduction to the many possible applications of same. Such is my belief that you are the best judge of how to apply the SM26S once you really understand its workings.

**Dennis Bohn
Rane Corporation**

**RaneNote 108
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Block Diagram

A complete block diagram of the SM26S appears as Figure 1. (Get your eyeglasses, you may need them.) Stereo input pairs are accommodated by the individual LEFT and RIGHT INPUT jacks. Expansion or “daisy chaining” is possible through the use of the parallel EXPAND OUT jacks. A dual ganged MASTER INPUT LEVEL control sets the gain from off to +12 dB for both Inputs.

From here, the Master Inputs feed a left and right mixing bus to each of the six MIX pots, as well as going straight through to the MASTER OUTPUT LEVEL control stage which feeds the Left and Right Mix Outputs. The Output from each of the Mix pots feeds the individual Mono Channel Level stages through a

switching contact associated with the MONO IN jack. (The jacks are drawn in their open, i.e., unused state. Inserting a plug into the MONO IN jack causes the auxiliary switch to change position.) The combined left and right signals go to each of the channel Outputs.

Individual mono inputs enter through the MONO IN jacks, through the (now closed) auxiliary switch to the +12dB gain stage where it feeds the MONO OUT jack. The PAN pot splits the signal into two signals that feed the LEFT and RIGHT MIX OUTPUTs via the Master Outputs.

It's really quite simple. Now let's look at specific configurations, leaving out the unused circuitry.

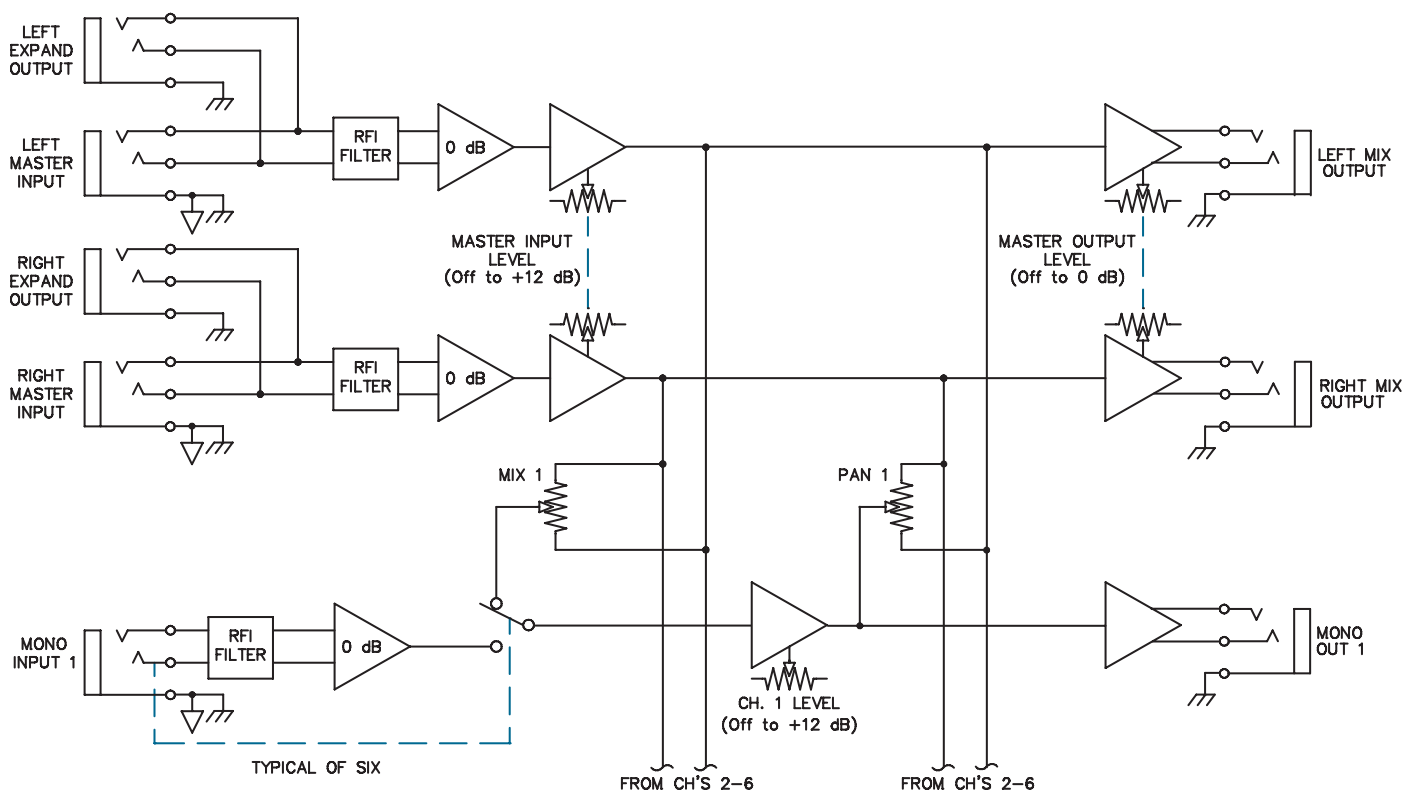
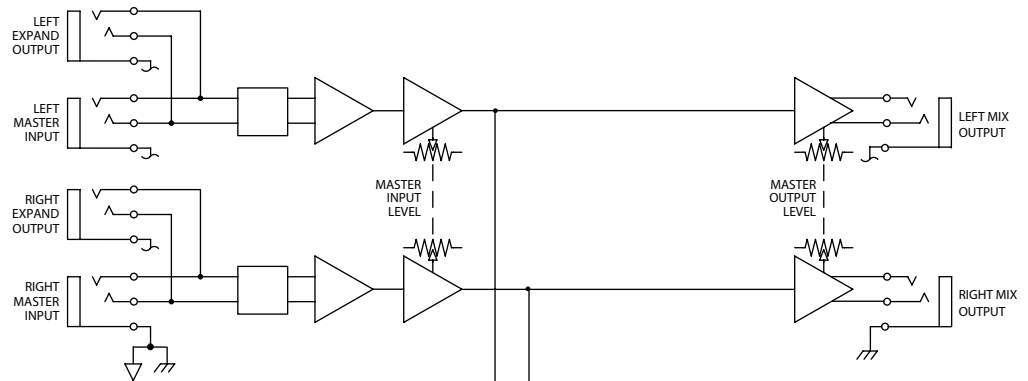


Figure 1. SM26S Complete Block Diagram



6+ In / 2 Out Mixer

Figure 2 diagrams the SM26S signal path when configured as a 6+ In/2 Out mixer. The individual Inputs are connected to each of the six MONO IN jacks and the combined Outputs are taken from the LEFT AND RIGHT MIX OUTPUT Jacks. The “plus” comes from the fact that the LEFT and RIGHT INPUTS also connect to the LEFT and RIGHT MIX OUTPUTS. There is no pan capability on these two Inputs, but each of them does sum with the 6 MONO INs to produce a 6 plus LEFT to the LEFT OUTPUT and a 6 plus RIGHT to the RIGHT OUTPUT option if so desired.

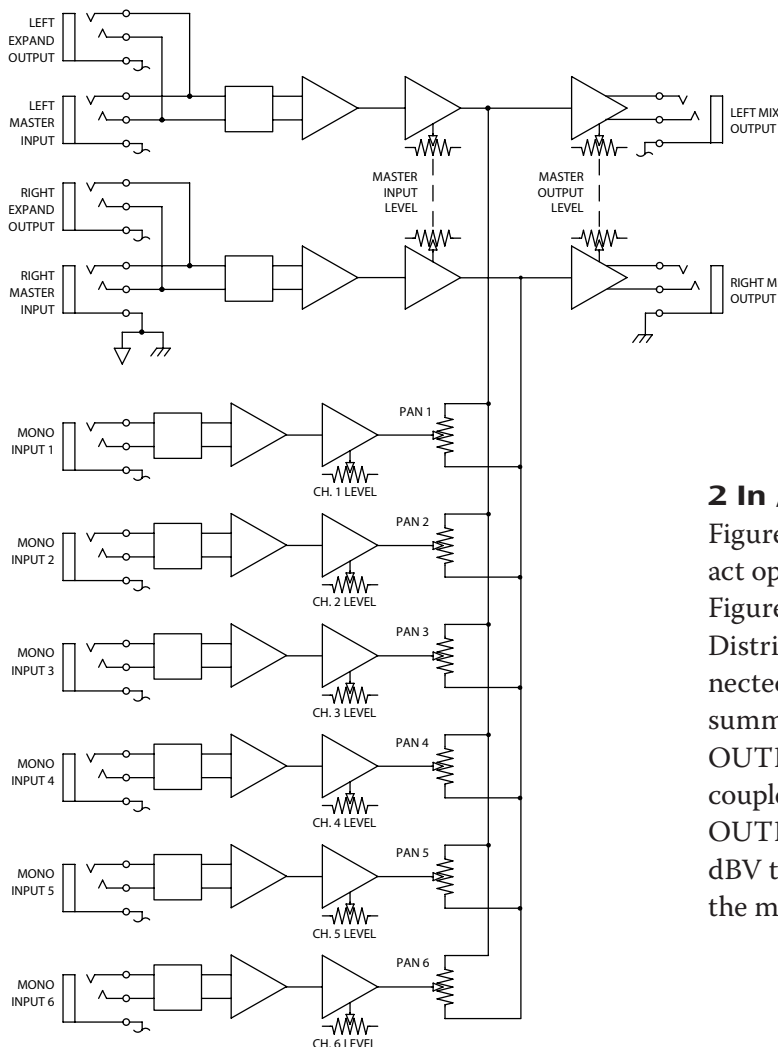


Figure 2. 6+ In / 2 Out Mixer Configuration

Figure 3. 2 In / 6+ Out Splitter / Distribution Amp

2 In / 6+ Out Splitter / Distribution Amplifier

Figure 3 shows how the SM26S can be used in the exact opposite mode as described above. When wired per Figure 3, the SM26S becomes a 2 In / 6+ Out Splitter/ Distribution Amp. The master stereo signal is connected to the LEFT and RIGHT INPUT jacks and is summed via the six MIX pots to each of the MONO OUTPUTS. The “plus” is that the stereo bus is also coupled directly through to the LEFT and RIGHT MIX OUTPUTS. This allows signal translation from -10 dBV to +4 dBm or other level related conditioning to the master stereo bus before feeding other equipment.

6 In / 6 Out Buffer Amplifier

Figure 4 shows how the SM26S can be used as a “straight through” line buffer amplifier. Inputs are brought into the MONO IN jacks and exit from the MONO OUT jacks. Each channel has a separate +12dB gain stage with LEVEL control.

NOTE: One additional channel can be gained by rotating all the PAN pots fully CW and using the LEFT INPUT and LEFT MIX OUTPUT (or rotate tully CCW and use the RIGHT IN and OUT combination).

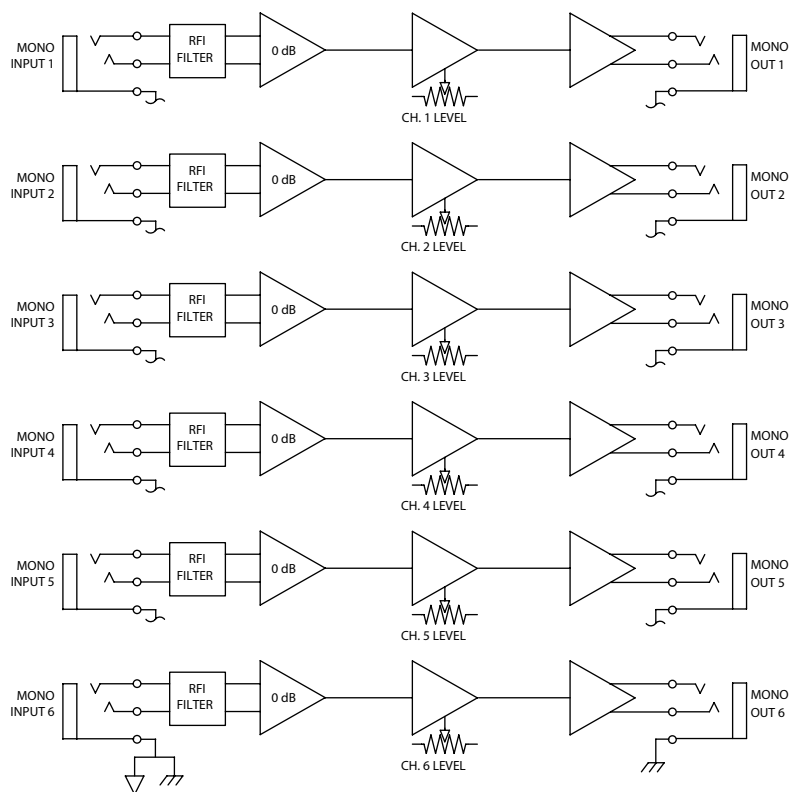


Figure 4. 6 In/6 Out Buffer Amplifier

Expansion

Expanding the input and output capacity of the SM26S Splitter Mixer is quite easy. Figure 5 shows the procedure for splitter mode expansion. The Left and Right Input buses are “daisy chained” using the EXPAND OUT jacks as shown, and the Outputs are taken directly from each SM26S's MONO OUTS.

Mixer expansion is the reverse procedure and appears as Figure 6. Inputs are brought into each of the SM26S's while their respective LEFT and RIGHT MIX OUTPUTS are used to cascade the chain by connecting to the LEFT and RIGHT INPUTS of the next SM26S, and so on.

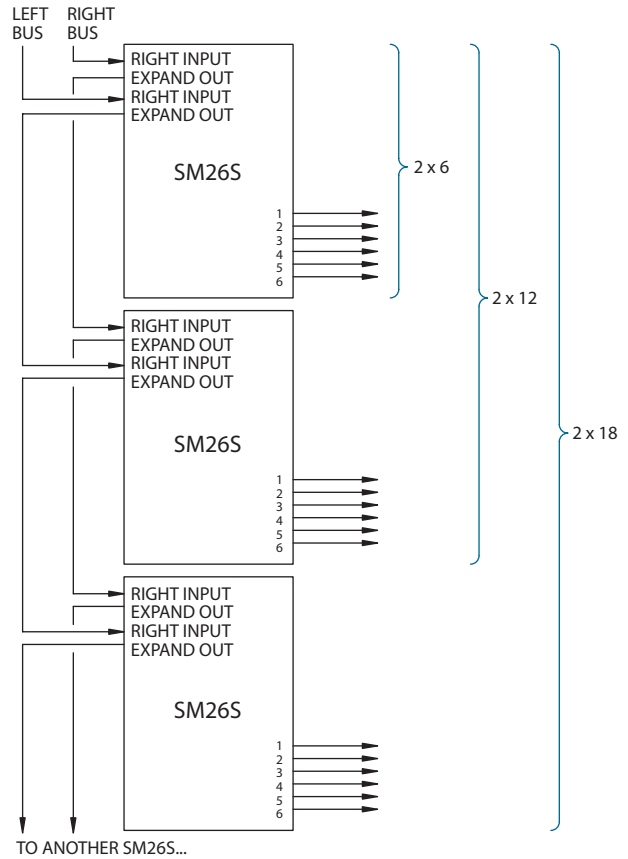


Figure 5. Splitter Expansion

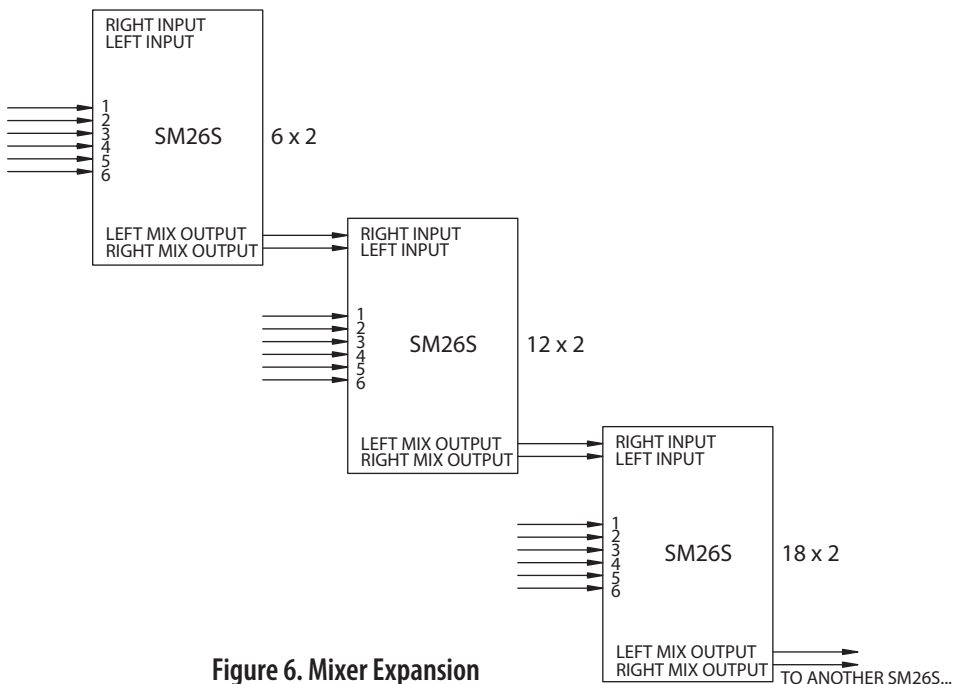


Figure 6. Mixer Expansion

Applications

The SM26S is unusually versatile in its applications. With the capability to mix 6 Mono Inputs down to one stereo pair, or split one stereo pair into 6 separate Outputs, or condition 6 Inputs by adding gain or attenuation—all of this either balanced or unbalanced and able to drive 600 Ω lines, makes the SM26S truly a “Swiss Army Mixer”. Further, any combination of the above can occur at the same time, in the same unit.

1 In / 3 Out + 3 In / 3 Out Combination

For instance, you can split one signal into three separate Outputs with individual LEVEL controls and use the remaining three MONO INS and OUTS as buffer/line driving amps, creating a 1-to-3 / 3-to-3 combination.

6 In / 6+2 Out

Another interesting combination is to use the SM26S as a 6 In / 6 Out level translation amplifier (infinite cut to +12 dB boost) and also mix the 6 Mono Inputs down to one stereo pair with the PAN pots. The stereo Output appears at the LEFT and RIGHT MIX OUTPUT jacks.

6+2 In / 2 Out

Or bring 6 Mono and 1 Stereo pair into the SM26S and add the 6 MONO INs to the stereo pair via the PAN pots. You now have a 6+2 In / 2 Out situation with the 6 Mono Inputs still available as 6 buffered Outputs if needed.

Zone Amplifier Level Controls

Adding individual remote level controls to the MA 3 Multichannel Amplifier is easy with the SM26S as diagrammed in Figure 7. The mono signal is applied to the LEFT INPUT jack and the 6 balanced MONO OUTS are connected to the balanced inputs of the MA 3. Rotating all MIX pots fully CCW routes the Input signal to each of the MONO OUTS. Each individual Output is adjusted by its respective channel LEVEL control.

If separate sources are connected to the LEFT and RIGHT INPUT jacks then the individual MIX pots will determine which source (or combination of both) is presented to each of the MONO OUTS. Full CCW rotation gives Left only; full CW rotation gives Right only; and the middle position gives equal amounts of Left plus Right.

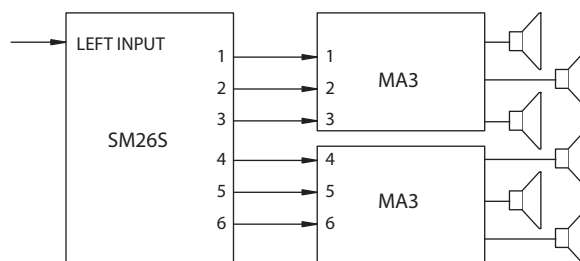


Figure 7. Level Controls for two MA 3 Amplifiers

Stereo Headphone Mixer

Figure 8 shows how the SM26S can be used as a 6 In / 2 Out stereo mixer driving the HC 6 Headphone Console. Six Mono Inputs are brought into the SM26S where they are mixed together via the PAN pots to create a stereo output signal at the LEFT and RIGHT MIX OUTPUT jacks. These lines are connected to the MASTER LEFT and RIGHT INPUT jacks of the HC 6 where they drive the six stereo headphone amplifiers.

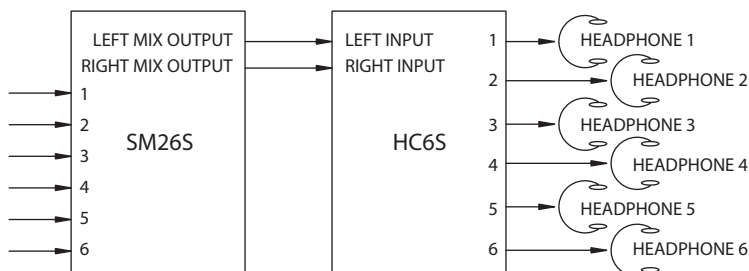


Figure 8. Stereo Headphone Mixer

6-to-1-to-6 Mixer Splitter

Figure 9 shows how to use *two* SM26S's to create a 6-to-1 mix then a 1-to-6 splitter, to drive the six channels of two MA 3 amplifiers. In just six rack spaces, this configuration creates a complete six-channel mixer zone amplifier system.

The controls of the first SM26S are used to condition and mix the six Mono Input signals while the controls of the second SM26S are used to set the individual Levels of the six amplifiers.

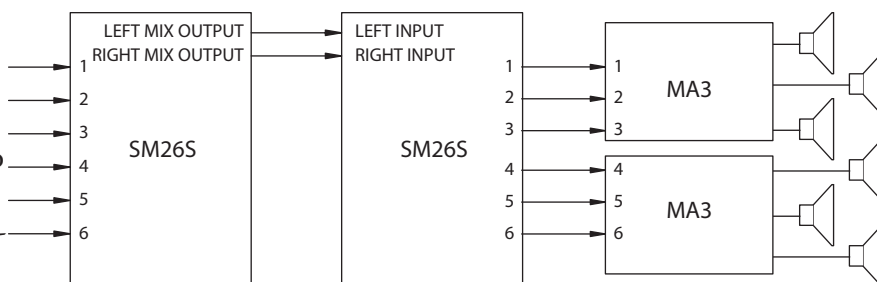


Figure 9. Mixer Splitter

4-Channel Stereo Splitter

Don't get into the mind trap of thinking of the SM26S as only a mono splitter mixer. It can function equally well as a stereo splitter mixer. Figure 10 shows how to configure the SM26S as a 4-channel stereo splitter. The stereo Input pair is brought into the Left and Right INPUT jacks and then routed via the MIX pots to all of the Outputs. By setting Channels 1, 3 and 5 for full Left mix and channels 2, 4 and 6 for full Right mix, you split the incoming signal into 3 stereo output pairs available from OUTS 1 & 2, 3 & 4, and 5 & 6 respectively. The 4th stereo Output pair is taken from the Left and Right MIX OUTPUT jacks as shown. (Note: use of the 4th independent stereo output requires an internal jumper modification.)

Stereo mixing is done in the exact opposite manner. Up to 4 stereo pairs are brought into all Inputs by connecting one pair to the Left and Right INPUT jacks and the three remaining "lefts" to Channels 1, 3 and 5, and the "rights" to Channels 2, 4 and 6. Now by rotating all odd PAN pots fully CCW(Left) and all even PANs fully CW(Right), you have mixed all 4 pairs down to 1 master pair available at the Left and Right MIX OUTPUTS.

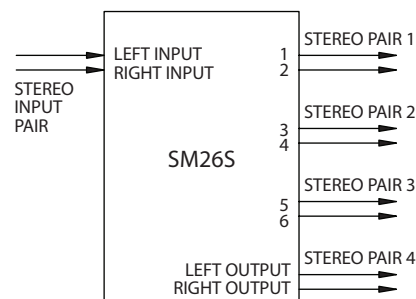


Figure 10. Four Channel Stereo Splitter

Guitar Racks

Figures 11-13 show three possible ways to connect a guitar amp to multiple effects. Figure 11 involves buying or building a cable that parallels all of the inputs of the effects so one loop output drives them all. This works and should cause no great difficulty if the output impedance of the amplifier loop is low. Outputs of 1k ohms or less should be able to drive as many effects devices as you would ever want. A second amplifier could be used from the other Mix Output of the SM26S for stereo.

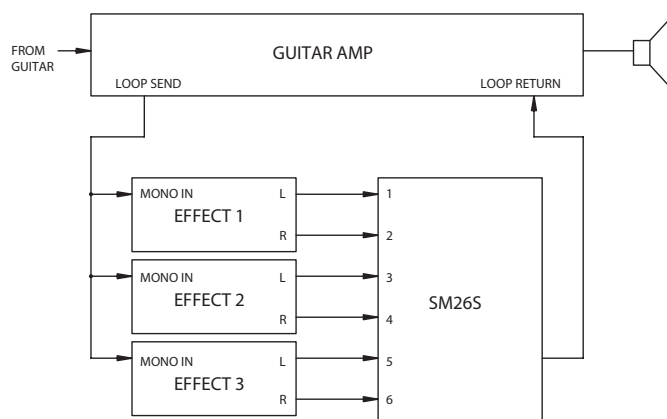


Figure 11. Guitar Effects Mixer

Many effects have mono inputs and stereo outputs. In this case, connect the left and right outputs of Effect 1 to MONO IN CHANNELS 1 and 2 of the SM26S respectively. Rotate the MIX/PAN control of Channel 1 all the way to the Left and the MIX/PAN of Channel 2 all the way to the Right. This preserves the mix of the effects' stereo output and passes it to the LEFT & RIGHT MIX OUTPUTS of the SM26S. Continue with Channels 3 & 4 for the second effect and Channels 5 & 6 for the last effect. Set the Channel LEVEL pairs to the same levels to preserve the intended mix of the stereo effect.

The best way, shown in figure 12, uses one SM26S as a splitter to actively split the signal into as many as six separate feeds (or three stereo) for the effects inputs. To mix all of the effects outputs back together, a second SM26S connected as a mixer could be enough Inputs for a mono system, or an SM 82 with *eight stereo* Inputs works great for a stereo system.

Now here's a way to *split and mix with one SM26S*, shown in Figure 13. From the loop output going to the LEFT INPUT, Channels 1,2 and 3 will act as the **splitter**, with their pan controls all the way to the left bus. Since the MONO IN jacks *know* that an individual Input overrides the master Input...Channels 4,5 and 6 will act as the **mixer**, with their pan controls all the way to the right. The RIGHT MIX OUTPUT returns signal to the amplifier. Cool!

DJ Effects Mixer

DJ mixers have stereo sends and returns, but it's just as easy to use the SM26S to combine 3 stereo effects (or an SM 82 for 8 stereo effects). The concept is the same as the Guitar Rack in Figure 11, but in stereo. See Figure 14.

And More

The range of applications of the Model SM26S Splitter Mixer is staggering and have been barely touched in this RaneNote. From simple sub-mixing to complex split-mix combinations, to individual equipment signal conditioning, to line splitting, to your unique application, the list of uses for the SM26S goes on and on. Experiment and have fun!

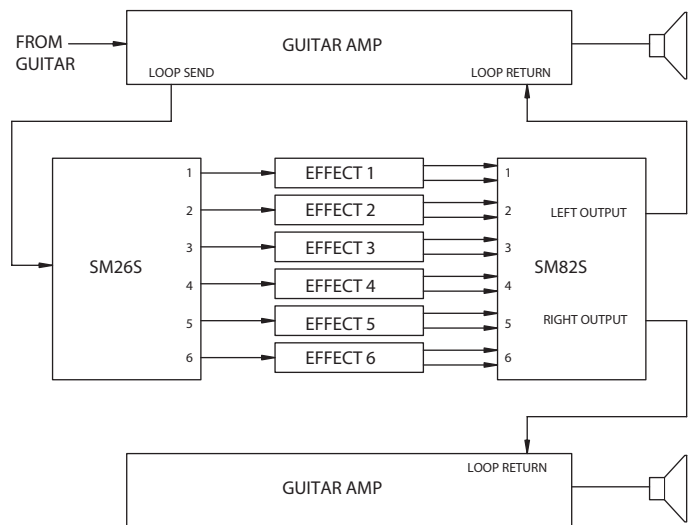


Figure 12. Ultimate Guitar Effects Splitter/Mixer

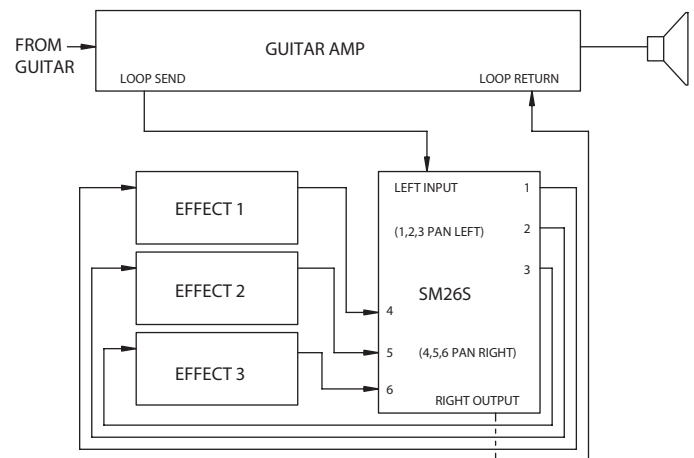


Figure 13. Mono Guitar Effects Splitter/Mixer

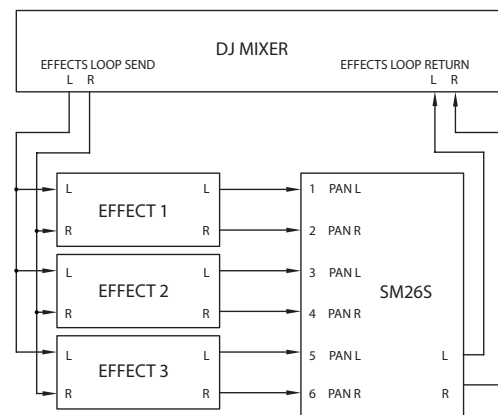


Figure 14. DJ Mixer Effects Loop Mixer

Sound System Interconnection

- Cause & prevention of ground loops
- Interfacing balanced & unbalanced
- Proper pin connections and wiring
- Chassis ground vs. signal ground
- Ground lift switches

Rane Technical Staff

RaneNote 110

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Introduction

This note, originally written in 1985, continues to be one of our most useful references. It's popularity stems from the continual and perpetual difficulty of hooking up audio equipment without suffering through all sorts of bizarre noises, hums, buzzes, whistles, etc.— not to mention the extreme financial, physical and psychological price. As technology progresses it is inevitable that electronic equipment and its wiring should be subject to constant improvement. Many things *have* improved in the audio industry since 1985, but unfortunately wiring isn't one of them. However, finally the Audio Engineering Society (AES) has issued a standards document for interconnection of pro audio equipment. It is AES48, titled "AES48-2005: AES standard on interconnections —Grounding and EMC practices — Shields of connectors in audio equipment containing active circuitry."

Rane's policy is to accommodate rather than dictate. However, this document contains suggestions for external wiring changes that should ideally only be implemented by trained technical personnel. Safety regulations require that all original grounding means provided from the factory be left intact for safe operation. No guarantee of responsibility for incidental or consequential damages can be provided. *(In other words, don't modify cables, or try your own version of grounding unless you really understand exactly what type of output and input you have to connect.)*

Ground Loops

Almost all cases of noise can be traced directly to ground loops, grounding or lack thereof. It is important to understand the mechanism that causes grounding noise in order to effectively eliminate it. Each component of a sound system produces its own ground internally. This ground is usually called the audio *signal* ground. Connecting devices together with the interconnecting cables can tie the signal grounds of the two units together in one place through the conductors in the cable. Ground loops occur when the grounds of the two units are also tied together in another place: via the third wire in the line cord, by tying the metal chassis together through the rack rails, etc. These situations create a circuit through which current may flow in a closed “loop” from one unit’s ground out to a second unit and back to the first. It is not simply the presence of this current that creates the hum—it is when this current flows through a unit’s audio signal ground that creates the hum. In fact, even without a ground loop, a little noise current always flows through every interconnecting cable (i.e., it is impossible to eliminate these currents entirely). The mere presence of this ground loop current is no cause for alarm if your system uses properly implemented and *completely* balanced interconnects, which are excellent at rejecting ground loop and other noise currents. Balanced interconnect was developed to be immune to these noise currents, which can never be entirely eliminated. What makes a ground loop current annoying is when the audio signal is affected. Unfortunately, many manufacturers of balanced audio equipment design the internal grounding system improperly, thus creating balanced equipment that is not immune to the cabling’s noise currents. This is one reason for the bad reputation sometimes given to balanced interconnect.

A second reason for balanced interconnect’s bad reputation comes from those who think connecting unbalanced equipment into “superior” balanced equipment should improve things. Sorry. Balanced interconnect is not compat-

ible with unbalanced. The small physical nature and short cable runs of completely unbalanced systems (home audio) also contain these ground loop noise currents. However, the currents in unbalanced systems never get large enough to affect the audio to the point where it is a nuisance. Mixing balanced and unbalanced equipment, however, is an entirely different story, since balanced and unbalanced interconnect are truly *not compatible*. The rest of this note shows several recommended implementations for all of these interconnection schemes.

The potential or voltage which pushes these noise currents through the circuit is developed between the independent grounds of the two or more units in the system. The impedance of this circuit is low, and even though the voltage is low, the current is high, thanks to Mr. Ohm, without whose help we wouldn’t have these problems. It would take a very high resolution ohm meter to measure the impedance of the steel chassis or the rack rails. We’re talking thousandths of an ohm. So trying to measure this stuff won’t necessarily help you. We just thought we’d warn you.

The Absolute Best Right Way To Do It

The method specified by AES48 is to use balanced lines and *tie the cable shield to the metal chassis (right where it enters the chassis) at both ends of the cable*.

A balanced line requires three separate conductors, two of which are signal (+ and –) and one shield (see Figure 1a). The shield serves to guard the sensitive audio lines from interference. Only by using balanced line interconnects can you *guarantee* (yes, *guarantee*) hum-free results. Always use twisted pair cable. Chassis tying the shield at each end also *guarantees* the best possible protection from RFI [radio frequency interference] and other noises [neon signs, lighting dimmers].

Neil Muncy¹, an electroacoustic consultant and seasoned veteran of years of successful system design, chairs the AES

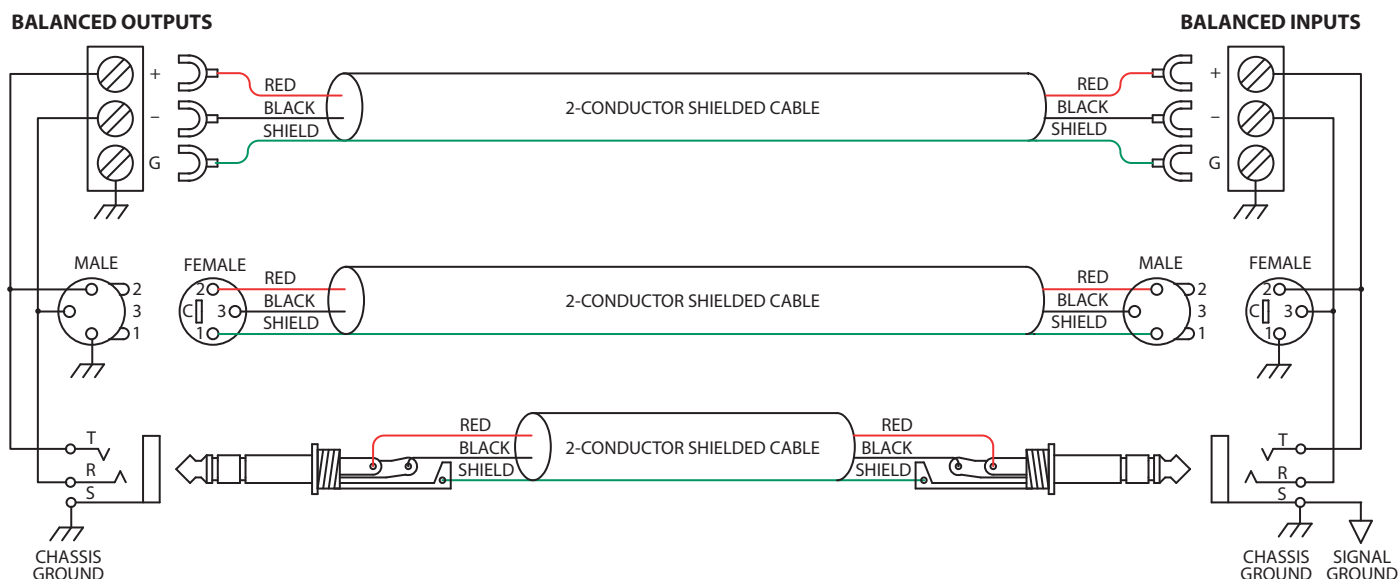


Figure 1a. The right way to do it.

Standards Committee (SC-05-05) working on this subject. He tirelessly tours the world giving seminars and dispensing information on how to successfully hook-up pro audio equipment². He makes the simple point that it is absurd that you cannot go out and buy pro audio equipment from several different manufacturers, buy standard off-the-shelf cable assemblies, come home, hook it all up and have it work hum and noise free. *Plug and play*. Sadly, almost never is this the case, despite the science and rules of noise-free interconnect known and documented for over 60 years (see References for complete information).

It all boils down to using balanced lines, only balanced lines, and nothing but balanced lines. This is why they were developed. Further, that you *tie the shield to the chassis, at the point it enters the chassis, and at both ends of the cable* (more on 'both ends' later).

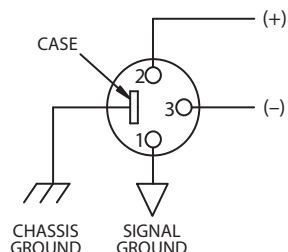
Since standard XLR cables come with their shields tied to pin 1 at each end (the shells are not tied, nor need be), this means equipment using 3-pin, XLR-type connectors *must tie pin 1 to the chassis* (usually called chassis ground) — not the audio signal ground as is most common.

Not using *signal ground* is the most radical departure from common pro-audio practice. Not that there is any argument about its validity. There isn't. **This is the right way to do it.** So why doesn't audio equipment come wired this way? Well, some does, and since 1993, more of it does. That's when Rane started manufacturing some of its products with balanced inputs and outputs tying pin 1 to chassis. So why doesn't everyone do it this way? Because life is messy, some things are hard to change, and there will always be equipment in use that was made before proper grounding practices were in effect.

Unbalanced equipment is another problem: it is everywhere, easily available and inexpensive. All those RCA and 1/4" TS connectors found on consumer equipment; effect-loops and insert-points on consoles; signal processing boxes; semi-pro digital and analog tape recorders; computer cards; mixing consoles; et cetera.

The next several pages give tips on how to successfully address hooking up unbalanced equipment. Unbalanced equipment when "blindly" connected with fully balanced units starts a pattern of hum and undesirable operation, requiring extra measures to correct the situation.

COMMON (WRONG) PRACTICE



RECOMMENDED PRACTICE

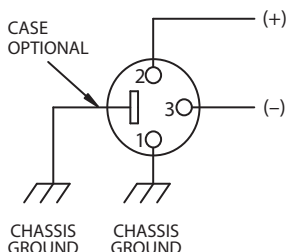


Figure 1b. Recommended practice.

The Next Best Right Way To Do It

The quickest, quietest and most foolproof method to connect balanced and unbalanced is to **transformer isolate all unbalanced connections**. See Figure 2.

Many manufacturers provide several tools for this task, including Rane. Consult your audio dealer to explore the options available.

The goal of these adaptors is to allow the use of *standard cables*. With these transformer isolation boxes, modification of cable assemblies is unnecessary. Virtually any two pieces of audio equipment can be successfully interfaced without risk of unwanted hum and noise.

Another way to create the necessary isolation is to use a *direct box*. Originally named for its use to convert the high impedance, high level output of an electric guitar to the low impedance, low level input of a recording console, it allowed the player to plug "directly" into the console. Now this term is commonly used to describe any box used to convert unbalanced lines to balanced lines.

The Last Best Right Way To Do It

If transformer isolation is not an option, special cable assemblies are a last resort. The key here is to prevent the shield currents from flowing into a unit whose grounding scheme creates ground loops (hum) in the audio path (i.e., most audio equipment).

It is true that connecting both ends of the shield is theoretically the best way to interconnect equipment — though this assumes the interconnected equipment is internally grounded properly. Since most equipment is *not* internally grounded properly, connecting both ends of the shield is not often practiced, since doing so usually creates noisy interconnections.

A common solution to these noisy hum and buzz problems involves disconnecting one end of the shield, even though one can not buy off-the-shelf cables with the shield disconnected at one end. The best end to disconnect is the receiving end. If one end of the shield is disconnected, the noisy hum current stops flowing and away goes the hum — but only at low frequencies. A ground-sending-end-only shield connection minimizes the possibility of high frequency (radio) interference since it prevents the shield from acting as an antenna to the next input. Many reduce this potential RF interference by providing an RF path through

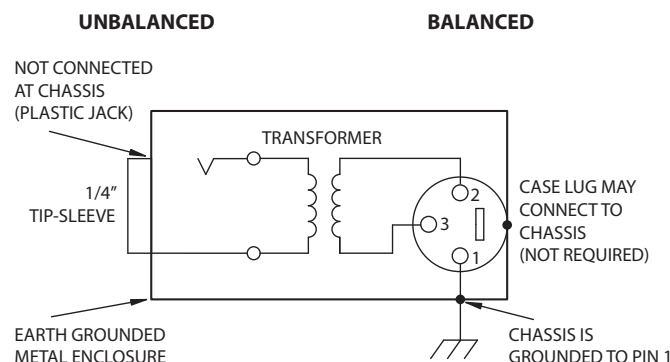


Figure 2. Transformer Isolation

a small capacitor (0.1 or 0.01 microfarad ceramic disc) connected from the lifted end of the shield to the chassis. (This is referred to as the “hybrid shield termination” where the sending end is bonded to the chassis and the receiving end is capacitively coupled. See Neutrik’s EMC-XLR for example.) The fact that many modern day installers still follow this one-end-only rule with consistent success indicates this and other acceptable solutions to RF issues exist, though the increasing use of digital and wireless technology greatly increases the possibility of future RF problems.

If you’ve truly isolated your hum problem to a specific unit, chances are, even though the documentation indicates proper chassis grounded shields, the suspect unit is not internally grounded properly. Here is where special test cable assemblies, shown in Figure 3, really come in handy. These assemblies allow you to connect the shield to chassis ground *at the point of entry*, or to pin 1, or to lift one end of the shield. The task becomes more difficult when the unit you’ve isolated has multiple inputs and outputs. On a suspect unit with multiple cables, try various configurations on each connection to find out if special cable assemblies are needed at more than one point.

See Figure 4 for suggested cable assemblies for your particular interconnection needs. Find the appropriate output configuration (down the left side) and then match this with the correct input configuration (across the top of the page.) Then refer to the following pages for a recommended wiring diagram.

Ground Lifts

Many units come equipped with ground lift switches. In only a few cases can it be shown that a ground lift switch improves ground related noise. (Has a ground lift switch ever *really* worked for you?) In reality, the presence of a ground lift switch greatly reduces a unit’s ability to be “properly” grounded and therefore immune to ground loop hums and buzzes. Ground lifts are simply another Band-Aid to try in case of grounding problems. It is true that an entire system of properly grounded equipment, without ground lift switches, is guaranteed (yes *guaranteed*) to be hum free. The problem is most equipment is *not* (both internally and externally, AC system wise) grounded properly.

Most units with ground lifts are shipped so the unit is “grounded” — meaning the chassis is connected to audio signal ground. (This should be the best and is the “safest” position for a ground lift switch.) If after hooking up your system it exhibits excessive hum or buzzing, there is an incompatibility somewhere in the system’s grounding configuration. In addition to these special cable assemblies that may help, here are some more things to try:

1. Try combinations of lifting grounds on units supplied with lift switches (or links). It is wise to do this with the power off!
2. If you have an entirely balanced system, verify all chassis are tied to a good earth ground, for safety’s sake and hum protection. Completely unbalanced systems never earth ground anything (except cable TV, often a ground loop source). If you have a mixed balanced and unbalanced system, do yourself a favor and use isolation transformers or, if you can’t do that, try the special cable assemblies described here and expect it to take many hours to get things quiet. May the Force be with you.
3. Balanced units with outboard power supplies (wall warts or “bumps” in the line cord) do *not* ground the chassis through the line cord. Make sure such units are solidly grounded by tying the chassis to an earth ground using a star washer for a reliable contact. (Rane always provides this chassis point as an external screw with a toothed washer.) Any device with a 3-prong AC plug, such as an amplifier, may serve as an earth ground point. Rack rails may or may not serve this purpose depending on screw locations and paint jobs.

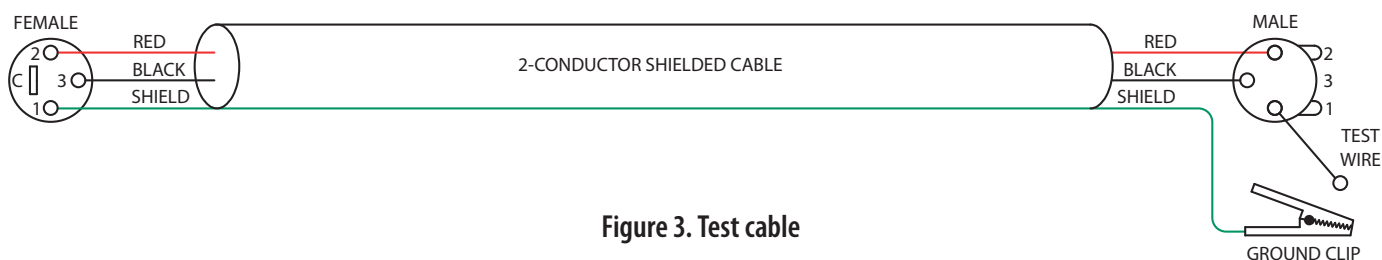


Figure 3. Test cable

Floating, Pseudo, and Quasi-Balancing

During inspection, you may run across a ¼" output called floating unbalanced, sometimes also called pseudo-balanced or quasi-balanced. In this configuration, the sleeve of the output stage is not connected inside the unit and the ring is connected (usually through a small resistor) to the audio signal ground. This allows the tip and ring to “appear” as an equal impedance, not-quite balanced output stage, even though the output circuitry is unbalanced.

Floating unbalanced often works to drive either a balanced or unbalanced input, depending if a TS or TRS standard cable is plugged into it. When it hums, a special cable is required. See drawings #11 and #12, and do not make the cross-coupled modification of tying the ring and sleeve together.

Winning the Wiring Wars

- Use balanced connections whenever possible, with the shield bonded to the metal chassis at both ends.
- Transformer isolate all unbalanced connections from balanced connections.
- Use special cable assemblies when unbalanced lines cannot be transformer isolated.
- Any unbalanced cable must be kept under 10 feet (3 m) in length. Lengths longer than this will amplify all the nasty side effects of unbalanced circuitry's ground loops.

Summary

If you are unable to do things correctly (i.e. use fully balanced wiring with shields tied to the *chassis* at both ends, or transformer isolate all unbalanced signals from balanced signals) then there is no guarantee that a hum-free interconnect can be achieved, nor is there a definite scheme that will assure noise-free operation in all configurations.

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- Band-Aid* is a registered trademark of Johnson & Johnson

To Input

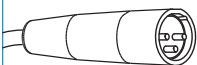
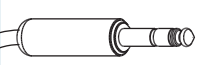
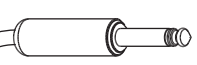
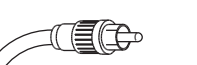
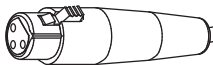
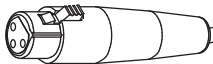
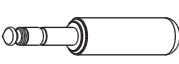
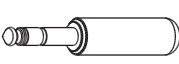
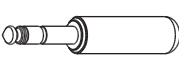
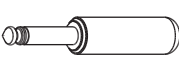
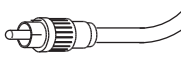
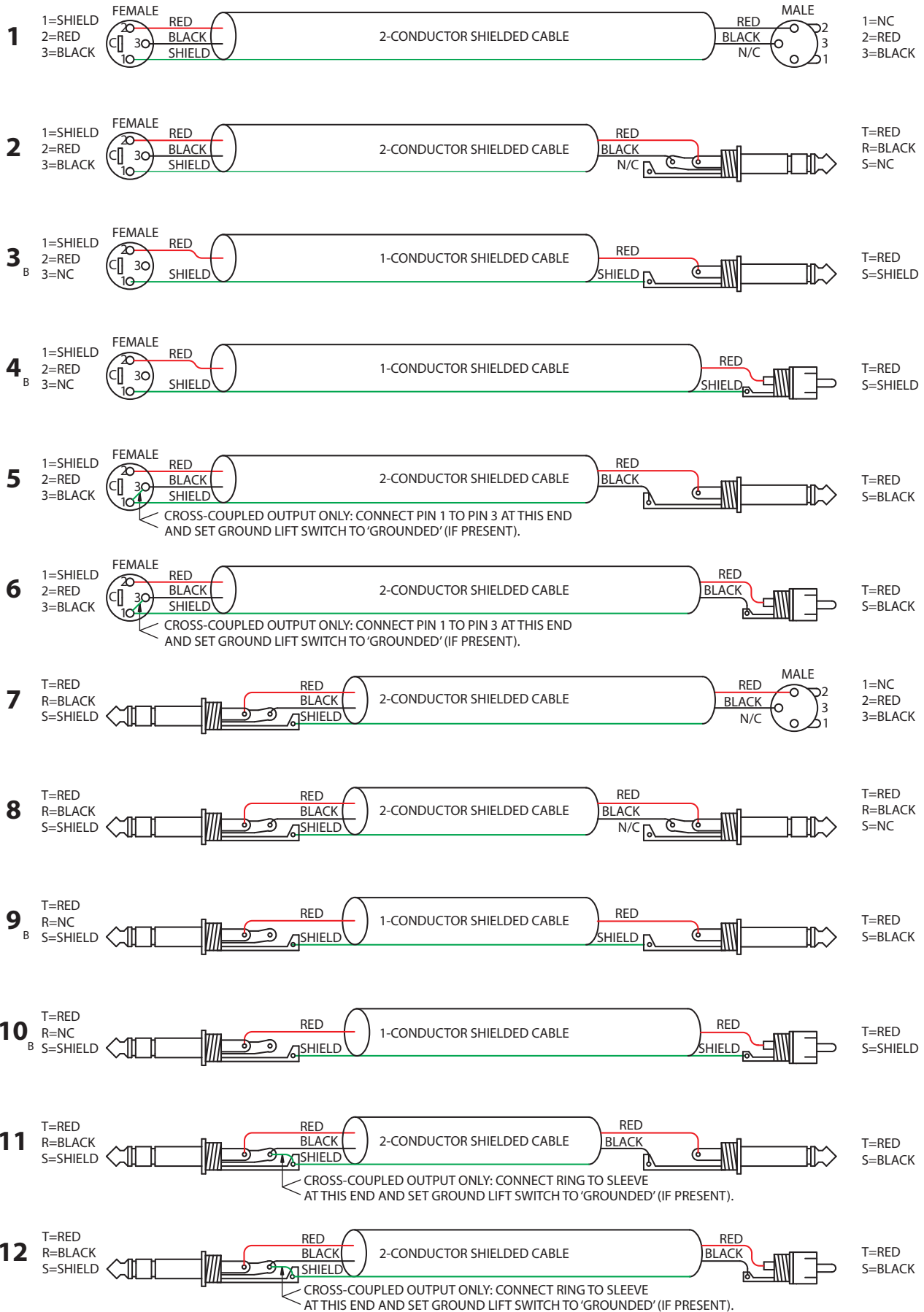
From Output	CABLE CONNECTORS	 MALE BALANCED XLR	 ¼" BALANCED TRS (TIP-RING-SLEEVE)	 ¼" OR 3.5mm UNBALANCED TS (TIP-SLEEVE)	 UNBALANCED RCA	 BALANCED EUROBLOCK
	 FEMALE BALANCED XLR (NOT A TRANSFORMER, NOR A CROSS-COUPLED OUTPUT STAGE)	1	2	3_B	4_B	+ to + - to - SHIELD NC
	 FEMALE BALANCED XLR (EITHER A TRANSFORMER OR A CROSS-COUPLED OUTPUT STAGE)	1	2	5	6	+ to + - to - SHIELD NC
	 ¼" BALANCED TRS (NOT A TRANSFORMER, NOR A CROSS-COUPLED OUTPUT STAGE)	7	8	9_B	10_B	+ to + - to - SHIELD ONLY TO EUROBLOCK
	 ¼" BALANCED TRS (EITHER A TRANSFORMER OR A CROSS-COUPLED OUTPUT STAGE)	7	8	11	12	+ to + - to - SHIELD NC
	 ¼" FLOATING UNBALANCED TRS (TIP-RING-SLEEVE) (SLEEVE IN UNIT = NC)	21_A	22_A	11	12	+ to + - to - GROUND to GROUND
	 ¼" OR 3.5 mm UNBALANCED TS (TIP-SLEEVE)	13	14	15_A	16_A	23
	 UNBALANCED RCA (TIP-SLEEVE)	17	18	19_A	20_A	23
	 BALANCED EUROBLOCK	+ to + - to - SHIELD ONLY TO XLR PIN 1	+ to + - to - SHIELD ONLY TO TRS SLEEVE	24	24	+ to + - to - GROUND to GROUND

Figure 4. Interconnect chart for locating correct cable assemblies on the following pages.

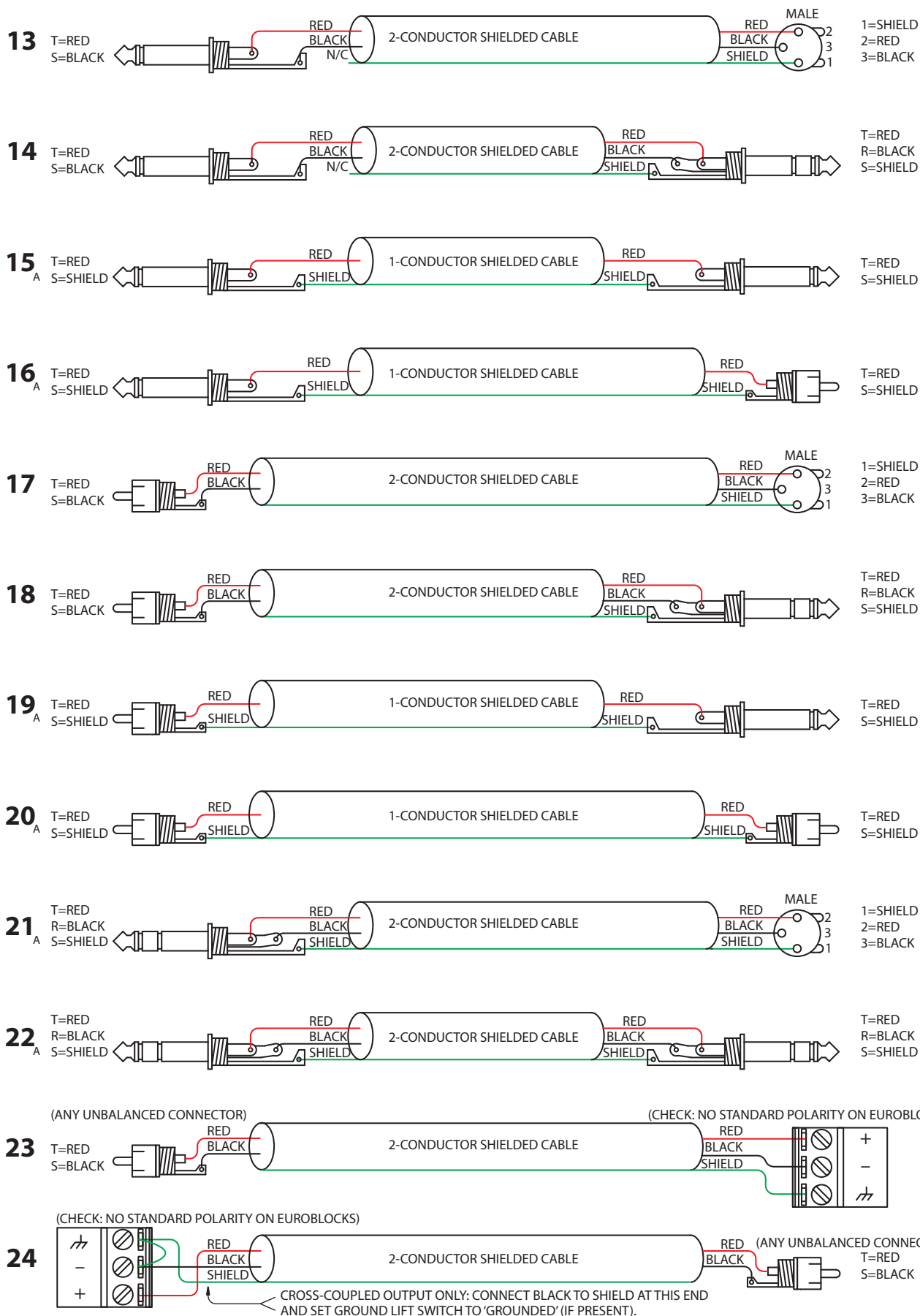
Note: (A) This configuration uses an “off-the-shelf” cable.

Note: (B) This configuration causes a 6 dB signal loss. Compensate by “turning the system up” 6 dB.



From Output

To Input





FACTORY AUTHORIZED SERVICE

Your unit may be serviced by the Rane Factory or any Authorized Rane Service Center. To find a Service Center near you, please call the Rane factory, or check the Rane website. Please do not return your unit to Rane without prior authorization.

Rane Corporation

To obtain service or a Return Authorization, please phone 425-355-6000

or Fax 425-347-7757

The current list of U.S. Rane Authorized Service Centers is found on our website: www.rane.com/service.html

LIMITED DOMESTIC WARRANTY

RANE CORPORATION WARRANTS ALL RANE PRODUCTS (EXCEPT THOSE ITEMS CLASSIFIED AS *WEAR PARTS*, AND LISTED ON THE MANUAL-1 PAGE OF EACH OPERATORS MANUAL) PURCHASED IN THE USA AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP FOR A PERIOD OF TWO (2) YEARS. *WEAR PARTS* ARE LIMITED TO A PERIOD OF NINETY (90) DAYS FROM THE INITIAL DATE OF RETAIL PURCHASE FROM AN AUTHORIZED RANE DEALER—WEAR PARTS REQUIRE PROOF OF PURCHASE DATE. This limited warranty extends to all purchasers or owners of the product during the warranty period beginning with the original retail purchase. Rane Corporation does not, however, warrant its products against any and all defects: 1) arising out of material or workmanship not provided or furnished by Rane, or 2) resulting from abnormal use of the product or use in violation of instructions, or 3) in products repaired or serviced by other than authorized Rane repair facilities, or 4) in products with removed or defaced serial numbers, or 5) in components or parts or products expressly warranted by another manufacturer. Rane agrees to supply all parts and labor to repair or replace defects covered by this limited warranty with parts or products of original or improved design, at its option in each respect, if the defective product is shipped prior to the end of the warranty period to any Rane authorized warranty repair facility in the U.S. or to the Rane factory in the original packaging or a replacement supplied by Rane, with all transportation costs and full insurance paid each way by the purchaser or owner.

LIMITED WARRANTY OUTSIDE THE U.S.A.

RANE PRODUCTS ARE WARRANTED ONLY IN THE COUNTRY WHERE PURCHASED, THROUGH THE AUTHORIZED RANE DISTRIBUTOR IN THAT COUNTRY, AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP, THE SPECIFIC PERIOD OF THIS LIMITED WARRANTY SHALL BE THAT WHICH IS DESCRIBED TO THE ORIGINAL RETAIL PURCHASER BY THE AUTHORIZED RANE DEALER OR DISTRIBUTOR AT THE TIME OF PURCHASE. Rane Corporation does not, however, warrant its products against any and all defects: 1) arising out of materials or workmanship not provided or furnished by Rane, or 2) resulting from abnormal use of the product or use in violation of instructions, or 3) in products repaired or serviced by other than authorized Rane repair facilities, or 4) in products with removed or defaced serial numbers, or 5) in components or parts or products expressly warranted by another manufacturer. Rane agrees, through the applicable authorized distributor, to repair or replace defects covered by this limited warranty with parts or products of original or improved design, at its option in each respect, if the defective product is shipped prior to the end of the warranty period to the designated authorized Rane warranty repair facility in the country where purchased, or to the Rane factory in the U.S., in the original packaging or a replacement supplied by Rane, with all transportation costs and full insurance paid each way by the purchaser or owner.

ALL REMEDIES AND THE MEASURE OF DAMAGES ARE LIMITED TO THE ABOVE SERVICES, IT IS POSSIBLE THAT ECONOMIC LOSS OR INJURY TO PERSON OR PROPERTY MAY RESULT FROM THE FAILURE OF THE PRODUCT; HOWEVER, EVEN IF RANE HAS BEEN ADVISED OF THIS POSSIBILITY, THIS LIMITED WARRANTY DOES NOT COVER ANY SUCH CONSEQUENTIAL OR INCIDENTAL DAMAGES. SOME STATES OR COUNTRIES DO NOT ALLOW THE LIMITATIONS OR EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, ARISING BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE, OR OTHERWISE, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO A PERIOD OF TWO (2) YEARS FROM EITHER THE DATE OF ORIGINAL RETAIL PURCHASE OR, IN THE EVENT NO PROOF OF PURCHASE DATE IS AVAILABLE, THE DATE OF MANUFACTURE, SOME STATES OR COUNTRIES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE, COUNTRY TO COUNTRY.

WARRANTY PROCEDURE - Only Valid in the USA

NOTICE! You must complete and return the warranty card or register your product online to extend the Warranty from 2 years to 3 years!

TO VALIDATE YOUR EXTENDED WARRANTY: Use the postcard that came in the box with your unit, or go to www.rane.com and click on **New Product Registration**. Fill out the warranty completely, being sure to **include the model and serial number** of the unit since this is how warranties are tracked. If your Rane product was purchased in the USA, mail the completed card or register online with to Rane Corporation within 10 days from the date of purchase. **If you purchased the product outside the USA you must file your warranty registration with the Rane Distributor in that country.** It is advised that you keep your bill of sale as proof of purchase, should any difficulties arise concerning the registration of the warranty card. **NOTICE: IT IS NOT NECESSARY TO REGISTER IN ORDER TO RECEIVE RANE CORPORATION'S STANDARD TWO YEAR LIMITED WARRANTY.**

WARRANTY REGISTRATION is made and tracked by **model and serial numbers only**, not by the purchaser's or owner's name. Therefore any warranty correspondence or inquires **must** include the model and serial number of the product in question. Be sure to fill in the model and serial number in the space provided below and keep this in a safe place for future reference.

WARRANTY SERVICE MUST BE PERFORMED ONLY BY AN AUTHORIZED RANE SERVICE FACILITY LOCATED IN THE COUNTRY WHERE THE UNIT WAS PURCHASED, OR (if product was purchased in the USA) AT THE RANE FACTORY IN THE USA. If the product is being sent to Rane for repair, please call the factory for a Return Authorization number. We recommend advance notice be given to the repair facility to avoid possible needless shipment in case the problem can be solved over the phone. UNAUTHORIZED SERVICE PERFORMED ON ANY RANE PRODUCT WILL VOID ITS EXISTING FACTORY WARRANTY.

FACTORY SERVICE

If you wish your Rane product to be serviced at the factory, **it must be shipped fully insured, in the original packing box or equivalent.** This warranty will **not** cover repairs on products damaged through improper packaging. If possible, avoid sending products through the mail. Be sure to include in the package:

1. Complete return street shipping address (P.O. Box numbers are **not** acceptable).
2. A detailed description of any problems experienced, including the make and model numbers of any other system equipment.
3. Remote power supply, if applicable.

Repaired products purchased in the U.S. will be returned prepaid freight via the same method they were sent to Rane. Products purchased in the USA, but sent to the factory from outside the USA **must** include return freight funds, and the sender is fully responsible for all customs procedures, duties, tariffs and deposits.

In order to qualify for Rane's one year extended warranty (for a total of 3 years parts and labor), the warranty must be completely filled out and sent to us immediately. Valid in USA only.

We recommend you write your serial number here in your owners manual and on your sales receipt for your records.

SERIAL NUMBER: _____ **PURCHASE DATE:** _____

Declaration of Conformity

Application of Council Directive(s):

2001/95/EC
2012/19/EU
2004/108/EC
2006/95/EC
2011/65/EU

Standard(s) to which conformity is declared:

EN60065: 2002/A1:2006/A11:2008/A2:2010/A12:2011
EN55103-1:2009
EN55103-2:2009
EN50581:2012
ENVIRONMENT E2
CE MARK FIRST AFFIXED IN 2007
SERIAL NUMBERS 900000 - 999999

Manufacturer:

Rane Corporation
10802 47th Avenue West
Mukilteo WA 98275-5000 USA

This equipment has been tested and found to be in compliance with all applicable standards and regulations applying to the EU's Low Voltage (LV) directive 2006/95/EC, and Electromagnetic Compatibility (EMC) directive 2004/108/EC. In order for the customer to maintain compliance with this regulation, high quality shielded cable must be used for interconnection to other equipment. Modification of the equipment, other than that expressly outlined by the manufacturer, is not allowed under this directive. The user of this equipment shall accept full responsibility for compliance with the LV directive and EMC directive in the event that the equipment is modified without written consent of the manufacturer. This declaration of conformity is issued under the sole responsibility of Rane Corporation.

Type of Equipment: Professional Audio Signal Processing

Brand: Rane

Model: SM26S

Immunity Results:

THD+N re: 4 dBu, 400 Hz, BW=20-20kHz

Test Description

Results

Conditions

RF Electromagnetic Fields Immunity

80 MHz - 1000 MHz, 1 kHz AM, 80% depth, 3V/m

< -66 dB

80 MHz - 200 MHz

< -31 dB

200 MHz - 1000 MHz

Conducted RF Disturbances Immunity

150 kHz - 80 MHz, 1 kHz AM, 80% depth, 3V rms

< -82 dB

Power Lines

< -82 dB

Signal Lines

Magnetic Fields Immunity

50 Hz - 10 kHz, 4.0 - 0.4 A/m

< -70 dB

I, the undersigned, hereby declare that the equipment specified above conforms to the Directive(s) and Standard(s) shown above.



(Signature)

Michaël Rollins

(Full Name)

Compliance Engineer

(Position)

May 31, 2007

(Date)

Mukilteo WA USA

(Place)



SM26S

SPLITTER / MIXER

